

INSTRUCTION MANUAL

AND PARTS CATALOG

FOR

AGRO-POWER

TRACTOR DRIVEN ALTERNATOR

MODELS	SPECIFICATION
151C	15.0YD-3G197
201C	20.0YD-3G197
203C	20.0YD-5DG197
251C	25.0YD-3G197
253C	20.0YD-5DG197
301C	30.0YD-3G197
303C	30.0YD-5DG197

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SAFETY PRECAUTIONS

The following symbols in this manual signal potentially dangerous conditions to the operator or equipment. Read this manual carefully. Know when these conditions can exist. Then, take necessary steps to protect personnel as well as equipment.

WARNING This symbol is used throughout this manual to warn of possible serious personal injury.

CAUTION This symbol refers to possible equipment damage.

Study the following safety precautions carefully and insist that they be followed by those working with you and for you.

GUARD AGAINST ELECTRIC SHOCK

- Use extreme caution when working on electrical components. High voltage currents cause injury or death.
- Follow all state and local electrical codes. Have all electrical installations performed by a qualified licensed electrician.
- When working around electrical equipment, move cautiously to avoid shocks.
- Do not lunge after falling tools.
- Stop all power, and ground all high voltage points before touching wires.
- Make certain that power cannot be accidentally restored.
- Be sure power is off if you must work on underground electrical equipment.
- Do not examine live equipment when mentally or physically fatigued.
- Do not touch live electrical equipment while standing on metal floors, damp concrete or other well grounded surfaces.
- Do not handle live electrical equipment while wearing damp clothing (particularly wet shoes) or while skin surfaces are damp.
- Be extra cautious when working with alternator during a rain.

- Do not take unnecessary risks.
- Do not work alone.

EXHAUST GASES ARE TOXIC

- Provide an adequate exhaust system to properly expel discharged gases. Check exhaust system regularly for leaks.
- Be sure the unit is well ventilated.

PROTECT AGAINST MOVING PARTS

- Avoid moving parts of the unit. Loose jackets, shirts or sleeves should not be permitted because of the danger of becoming caught in moving parts.
- Clothing worn by the operator should be fairly tight and belted. Loose jackets, shirts, or sleeves should not be permitted because of the danger of getting into moving parts.
- Do not allow anyone to operate the alternator without proper instructions.
- Make sure all nuts and bolts are secure. Keep power shields and guards in position.
- If adjustments *must* be made while the unit is running, use extreme caution around moving parts, etc.
- Before lubricating alternator always:
 1. Disengage all power
 2. Shut off engine, and then
 3. Wait until rotor stops.

FIRE EXTINGUISHERS

- It is a good practice to have a fire extinguisher nearby. Be sure that the extinguisher is properly maintained and be familiar with its proper use.
- Extinguishers rated ABC by the NFPA are appropriate for all applications. Consult the local fire department for the correct type of extinguisher for various applications.

KEEP THE UNIT AND SURROUNDING AREA CLEAN

- Remove oil, grease, ice, snow or materials that create slippery conditions around unit.
- Remove oily rags and other materials that create potential fire hazards.

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GENERAL INFORMATION

INTRODUCTION

This instruction book contains information for the proper installation, operation and maintenance of your alternator. We suggest you keep this book handy so it can be referred to when necessary.

If you must contact your dealer or the distributor regarding this equipment, be sure to supply the complete Model and Specification Number and the full Serial Number to identify your equipment.

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OPTIONAL ACCESSORIES

Power Take-Off Shaft

Telescoping, shielded, heavy duty power take-off shafts (tumbling rods), recommended for use with PTO powered, gear drive alternators provide maximum safety for the operator. The six spline universal joint with snap ring type shield and quick disconnect feature, fits a 1-3/8-inch (35 mm) tractor PTO drive. The power take-off shaft operating lengths are: minimum 45 inch (1143 mm), maximum 60 inch (1524 mm); weight 35 pounds.

The operating speed may vary from 540-600 rpm depending on the load. The nominal PTO speed is 540 rpm at full load.

WARNING

TO AVOID POSSIBLE PERSONAL INJURY OR EQUIPMENT DAMAGE, A QUALIFIED ELECTRICIAN OR AN AUTHORIZED SERVICE REPRESENTATIVE MUST PERFORM INSTALLATION AND ALL SERVICE.

SPECIFICATIONS

	15 kW Model 151C	25 kW Model 251C	25 kW Model 253C
Starting Watts	37,500	62,500	70,000
Running Watts	15,000	25,000	25,000
Volts	120/240	120/240	240*
Phase	1	1	3
Hertz	60	60	60
Current (Amperes)	62.5	104	75
Power Factor	1.0	1.0	0.8
Wire	4	4	4
Brushless	Yes	Yes	Yes
Alternator Speed (Nominal)	1800	1800	1800
Tractor Speed (Nominal)	540	540	540
Minimum Horsepower Required, Driving Source	30	45	45
Gear Box Oil Capacity, Pints	1.0 Pt. (0.47 litre)	1.0 Pt. (0.47 litre)	1.0 Pt. (0.47 litre)
Recommended Gear Lubricant	SAE 90 EP	SAE 90 EP	SAE 90 EP
Weight	354 lbs. (161 kg)	438 lbs. (198 kg)	438 lbs. (198 kg)

	20 kW Model 201 C	20 kW Model 203 C	30 kW Model 301 C	30 kW Model 303 C
Starting Watts	52,000	57,500	80,000	95,000
Running Watts	20,000	20,000	30,000	30,000
Volts	120/240	120/240	120/240	120/240
Phase	1	3	1	3
Hertz	60	60	60	60
Current (Amperes)	83.3	60.2	125	90.3
Power Factor	1.0	0.8	1.0	0.8
Wire	4	4	4	4
Brushless	Yes	Yes	Yes	Yes
Alternator Speed (Nominal)	1800	1800	1800	1800
Tractor Speed (Nominal)	540	540	540	540
Minimum Horsepower Required Driving Source	35	35	55	55
Gear Box Oil Capacity, Pints	1.0 Pt. (0.47 litre)	1.0 Pt. (0.47 litre)	1.0 Pt. (0.47 litre)	1.0 Pt. (0.47 litre)
Gear Lubricant	SAE 90 EP	SAE 90 EP	SAE 90 EP	SAE 90 EP
Weight	398 lbs. (181 kg)	423 lbs. (192 kg)	483 lbs. (219 kg)	512 lbs. (232 kg)

* - Delta wound, one phase center tapped to deliver 120/240, single phase in capacities to 20 kW (75 amperes).

DESCRIPTION

ALTERNATOR DESCRIPTION

The YD PTO alternators (Figure 1) are four-pole, revolving field, brushless exciter, 1800 rpm models of drip-proof construction. Alternator design includes both single and three-phase, 60 hertz type alternators. The alternator rotor is fastened to the gear case by the rotor through-stud which passes through the rotor shaft, Figure 2.

The end bell and stator housing are attached by four through-studs which pass through the stator assembly to the gear case alternator adapter. The brushless exciter stator mounts in the end bell while the exciter rotor and its rotating rectifier assemblies mount on the alternator rotor shaft. The shaft is supported at both ends by lubricated ball bearings. A centrifugal blower on the drive end of the alternator draws air through the alternator for cooling.

The complete alternator includes a built-in exciter and voltage regulator, mounting feet, lifting eye, mounted gear box and splined drive shaft and control box, which includes voltmeter and a full output load plug.

Gear Box

The gear box and alternator adapter contain two helical gears supported by heavy duty ball bearings. The bearings and gears are lubricated by the gear box oil. The gear box requires 1.0-pint (.47 litre) of SAE 90 EP (extreme pressure) gear lubricant.

Control Box

The control box includes the voltage regulator, voltmeter, 15 amp duplex receptacle with circuit breaker, 50 amp welder receptacle with circuit breakers, a full output load connector with load circuit breakers, and a field circuit breaker. The load circuit breakers can be used as an on-off switch. Alternator power must feed into the farm electrical system through an approved double throw load transfer switch.

OPERATION

The basic operation of the alternator and voltage regulator involves the stator, voltage regulator, exciter field and armature, a full wave bridge rectifier, and the alternator rotor. Residual magnetism in the alternator rotor and a permanent magnet embedded in one exciter field pole begin the voltage build-up process as the alternator set starts running. Single-phase AC voltage, taken from one of the stator windings, is fed to the voltage regulator as a reference voltage for maintaining the alternator output voltage. The AC reference voltage is converted to DC by a silicon controlled rectifier bridge and fed into the exciter field windings. The exciter armature produces three-phase AC voltage that is converted to DC by the rotating rectifier assembly. The resultant DC voltage excites the alternator rotor winding to produce the stator output voltage for the AC load.

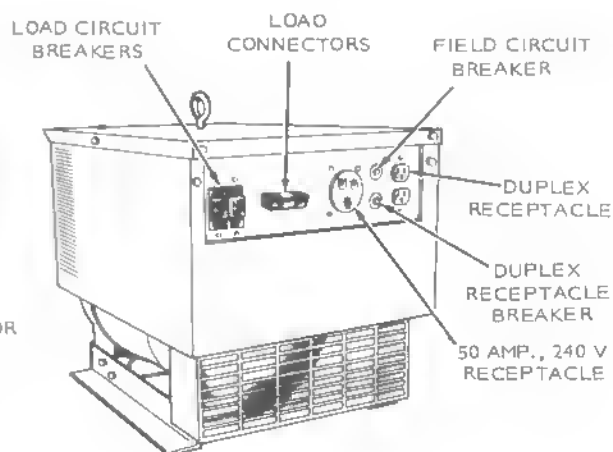
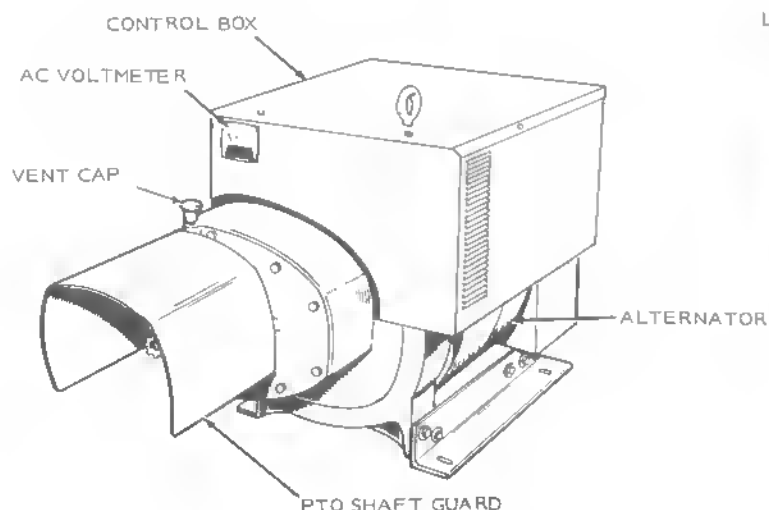


FIGURE 1. PTO-POWERED ALTERNATOR

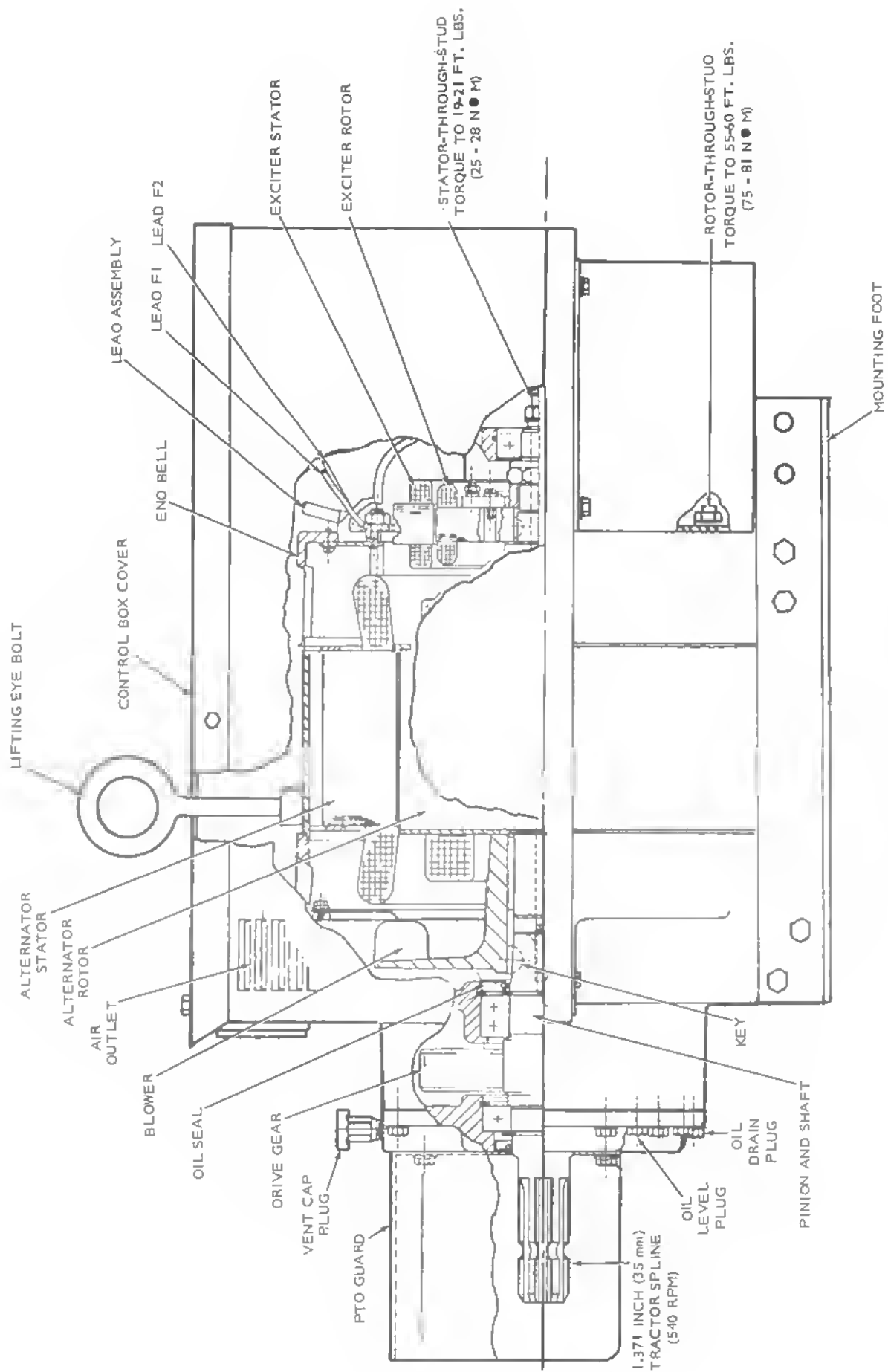


FIGURE 2. TRACTOR DRIVE ALTERNATOR

INSTALLATION

LOCATION

Figure 3 shows alternator dimensions and bolt-hole centers for installation. Select a site for the alternator with the following points in mind.

Ventilation

The alternator creates heat when operating under load conditions. It is important that this heat be removed by proper ventilation. If the alternator is installed inside a small room or compartment, provide a vent for exhausting the air heated by the alternator. Locate the heated air exhaust vent above the inlet vent. Heated air is discharged from the drive-shaft end of the alternator.

WARNING Provide an outlet for tractor exhaust if operating inside a building. Exhaust fumes are deadly! See carbon monoxide warning at the end of this section.

Convenience to Driving Power

Locate the alternator for easy connection to the tractor. Align the power take-off to the alternator. Stay within the limits of the tumbling rod.

Dusty or Damp Conditions

Avoid dusty or damp conditions as much as possible. Alternator should be mounted under cover or inside a building to protect it against the weather.

Servicing Convenience

Allow at least 24 inches (610 mm) of space on all sides of the alternator.

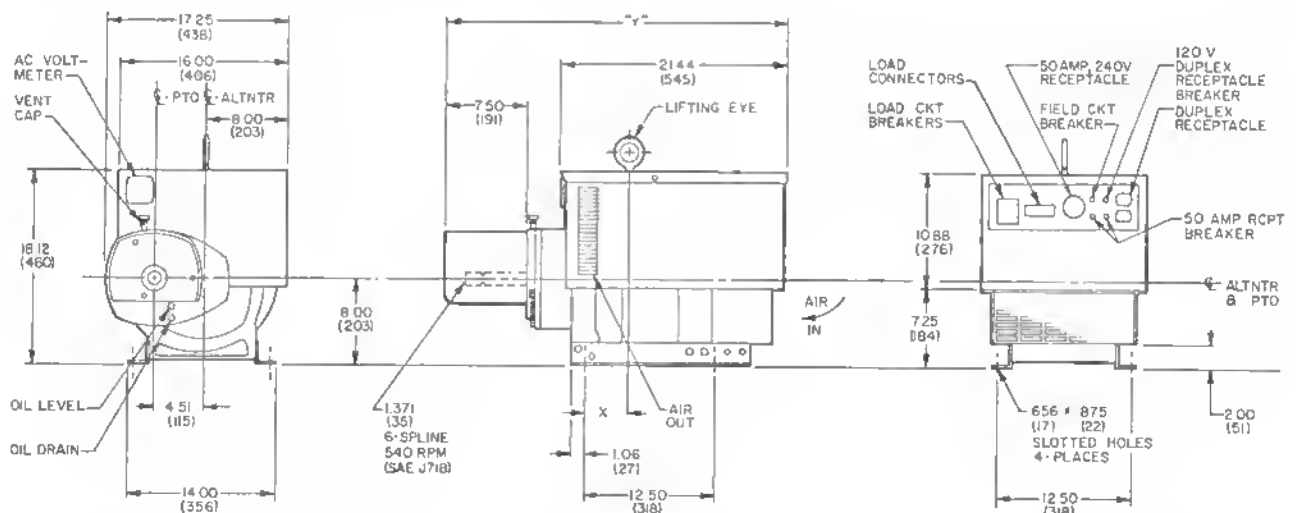
Wiring Convenience

Do not locate the alternator in a location difficult to service or which would have poor ventilation, to save a few feet of wiring. Install the alternator as close to the load transfer switch as possible.

MOUNTING THE ALTERNATOR

Provide a substantial mounting base of concrete, wood or steel. Figure 4 shows dimensions of recommended mounting base. The surface of the base should be level so the alternator mounting feet will not be sprung when tightened down.

CAUTION It requires about 55 horsepower at the power take-off to develop 30 kW. Therefore, the torque will flip the alternator over unless secured to a strong substructure. A narrow (30 inch, 762 mm) trailer is not suitable for operation. Forty inch hub-to-hub minimum measurement is required.



NOTES

DIMENSIONS SHOWN IN () ARE MILLIMETRES

THIRD ANGLE PROJECTION—

30 KW	8 12 (206)	516 LBS	(234 kg)	33.62 (854)
20 KA	5 25 (133)	423 LBS	(192 kg)	32.00 (813)
25 KW	6 12 (155)	438 LBS	(199 kg)	32.00 (813)
15 KW	4 38 (111)	354 LBS	(161 kg)	32.00 (813)
MODEL	DIM "X"	WEIGHT	MASS	DIM "Y"

FIGURE 3 . INSTALLATION OUTLINE

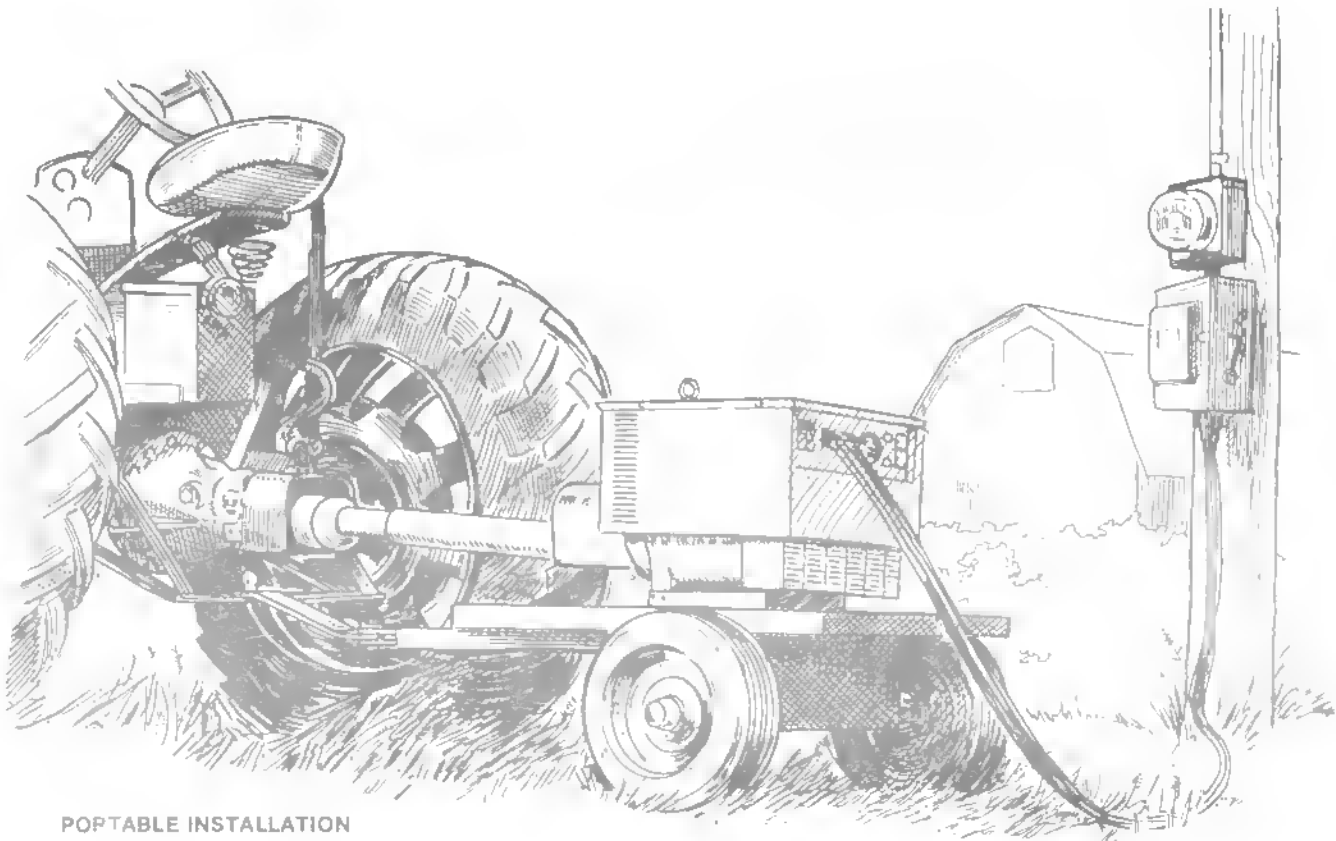
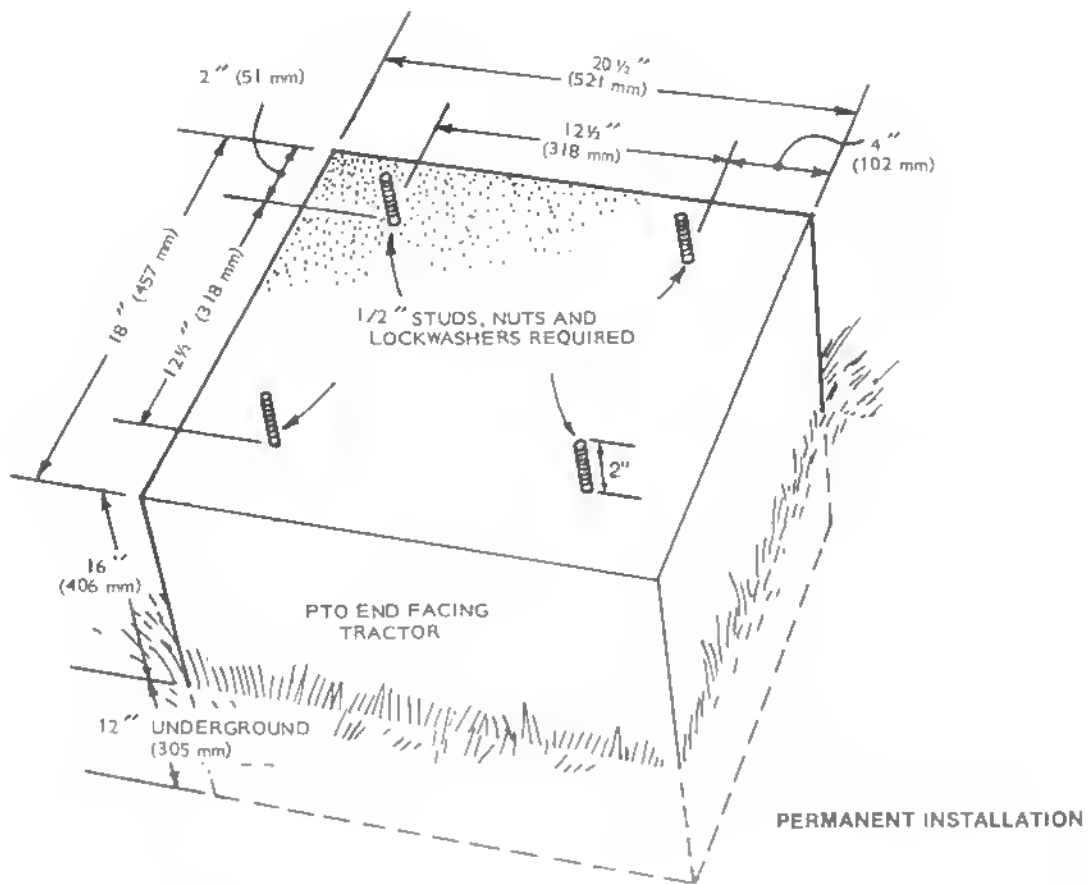


FIGURE 4. RECOMMENDED MOUNTINGS

PTO SHAFT INSTALLATION

Be sure that the tractor is properly aligned (parallel) with the alternator and that it will stay aligned during operation. See Figure 5.

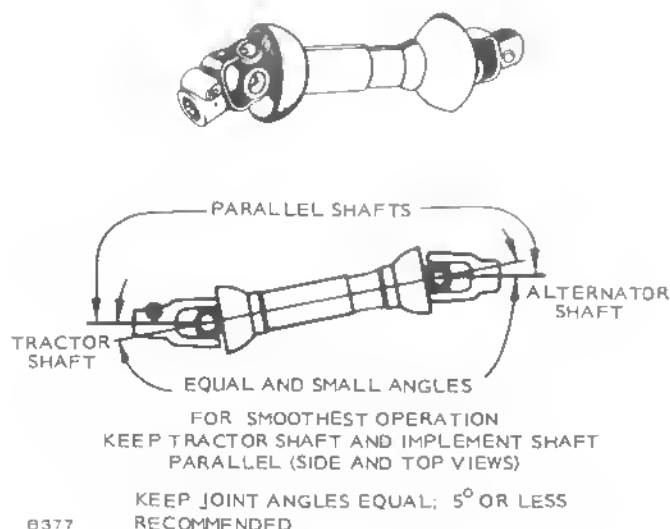


FIGURE 5. PTO SHAFT ALIGNMENT

CAUTION The tractor PTO spline and the alternator input spline must be parallel for smoothest operation with minimum wear in the U-joints on the PTO shaft.

WARNING The protective guards on the PTO shaft are for personnel safety. They can be removed for maintenance, but should always be in place for safe operation.

The U-joints and the telescoping shafts require grease every 25 hours of operation.

WIRING CONNECTIONS

For wiring connections with alternator mounted on a permanent base, connect load wires from output plug on alternator to load transfer switch. Use weather-protective fittings, couplings and wires throughout.

Recommendations:

- Connect each load wire connector to the proper output plug position on the control box.
- Insulate bare ends of ungrounded wires.
- Install a load transfer switch between the alternator and load.
- If a test indicates reversed rotation of three-phase motors in the load circuit, reverse the load connections at any two load leads (T1, T2, T3).

For portable use (alternator mounted on a trailer), connect load wires from output plug on alternator control box to an approved disconnect plug that can be connected to load transfer switch. Use a flexible power cord so cable can be easily wrapped up when not in use, Figure 4.

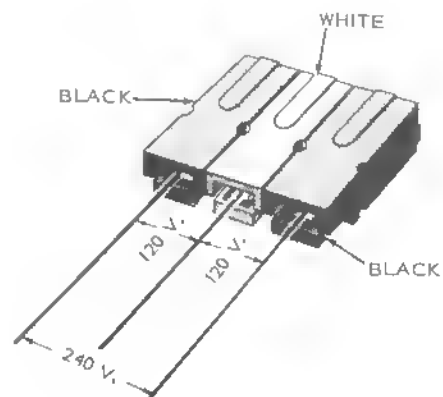


FIGURE 6. 120/240 VOLT, SINGLE PHASE CONNECTION

Receptacles on alternator control box allow connections when alternator has to be moved to the field or a remote location where no power is available.

SINGLE PHASE ALTERNATORS

With this connection, either 120 volts or 240 volts can be used alone or at the same time. Figure 6 shows a 120/240 volt, single phase connector.

THREE PHASE ALTERNATORS

The 3-phase alternator will supply 240 volts, 3 phase and 120 and 240 volts single phase current, Figure 7. All black terminals are used for 240 volt, three phase. For 240 volt single phase, connections are made between any two (black) three phase terminals. Two single phase, 120 volt connections are made between either of the two lower black terminals and the white terminal as shown in Figure 7. See caution regarding the 208 volt potential at the top connector.

Single phase connector, Figure 6, can be used in a three phase alternator.

CAUTION Do not try to connect 120 volt loads between this connector and the white connector. The voltage here is approximately 208 volts.

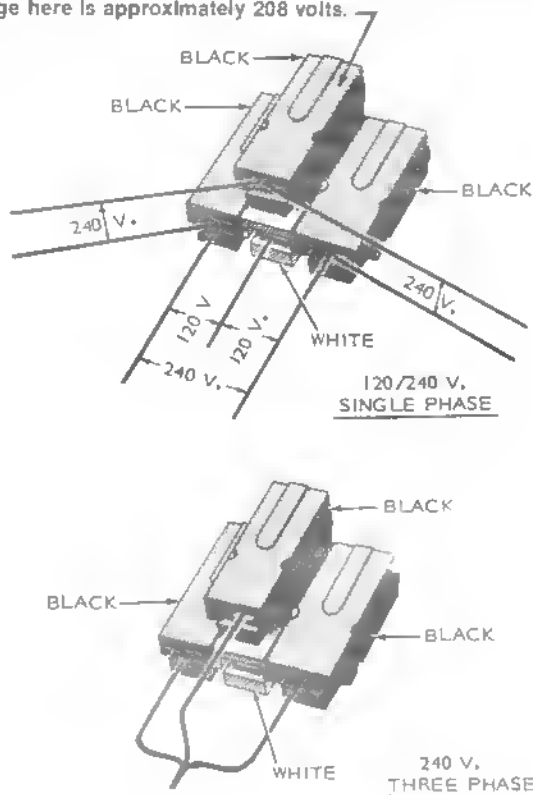


FIGURE 7. THREE PHASE 240 VOLT DELTA CONNECTIONS

INSTALLING THE LOAD TRANSFER SWITCH

Before using the alternator for standby purposes, install a **DOUBLE THROW LOAD TRANSFER SWITCH**. The switch must have an ampere rating large enough to carry the total load when the main source of power is in use. Follow the local electrical

code. The load transfer switch should always be installed close to the main line switch, and between the main line switch and the load. When properly installed, the load transfer switch in one position will connect the electrical load to the highline. When the load transfer switch is thrown to the other position, the load is first disconnected from the main source of power, and then connected to the tractor alternator. Using the load transfer switch makes it impossible to connect the alternator to the main source of power. The load lines must connect to the center terminals of the transfer switch. The alternator leads and the main power source leads must be connected at opposite ends of the switch.

POWER RETURN SIGNAL

When the alternator is used for emergency applications, install a pilot light or alarm signal to indicate when the power is restored and when the alternator can be disconnected. Connect a signal light across the regular power line, just ahead of the load transfer switch, Figure 8. Install an on-off switch and a fuse for the signal light. When a power failure occurs, snap the signal switch to the ON position before putting the alternator into operation. When the normal power returns, the signal operates and the alternator can then be disconnected.

COMBINATION SINGLE AND THREE PHASE LOAD TRANSFER CONNECTIONS

Two load transfer switches and additional wiring are required to connect one standby 3-phase alternator in locations where separate 1-phase and 3-phase power lines normally supply the power. A 3-pole, double throw switch alternately connects the 240 volt, 3-phase line transformer power or the 240 volt, 3-phase alternator motor loads. A 2-pole, double throw switch alternately connects the 120/240 volt, 1-phase line transformer power or the 1-phase alternator power to the 120 volt and 240 volt loads. The alternator and load transfer switches should be located close to the power line transformer which carries the heavier load. Separate power lines must be installed to carry power from the alternator to the lighter loads, Figure 9.

SINGLE PHASE ONLY

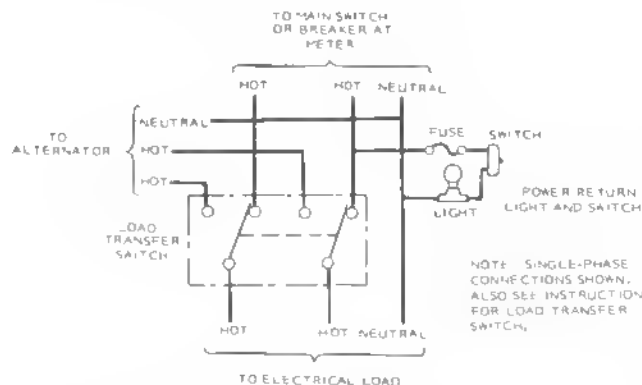
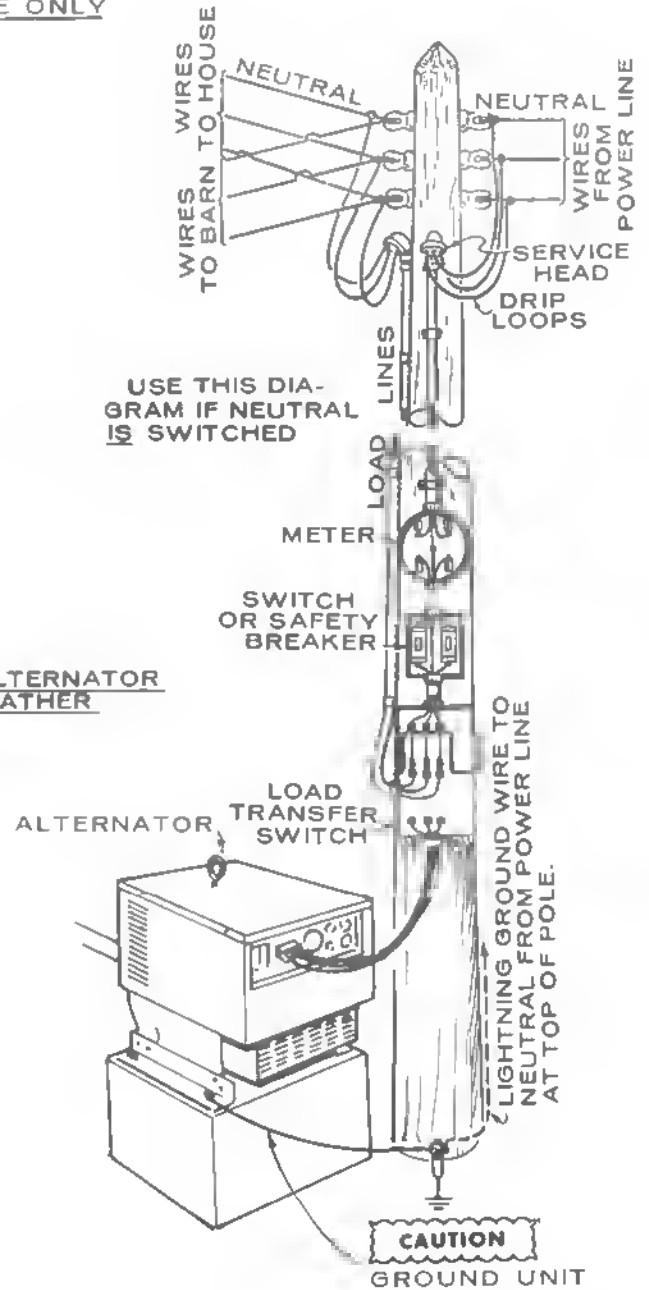
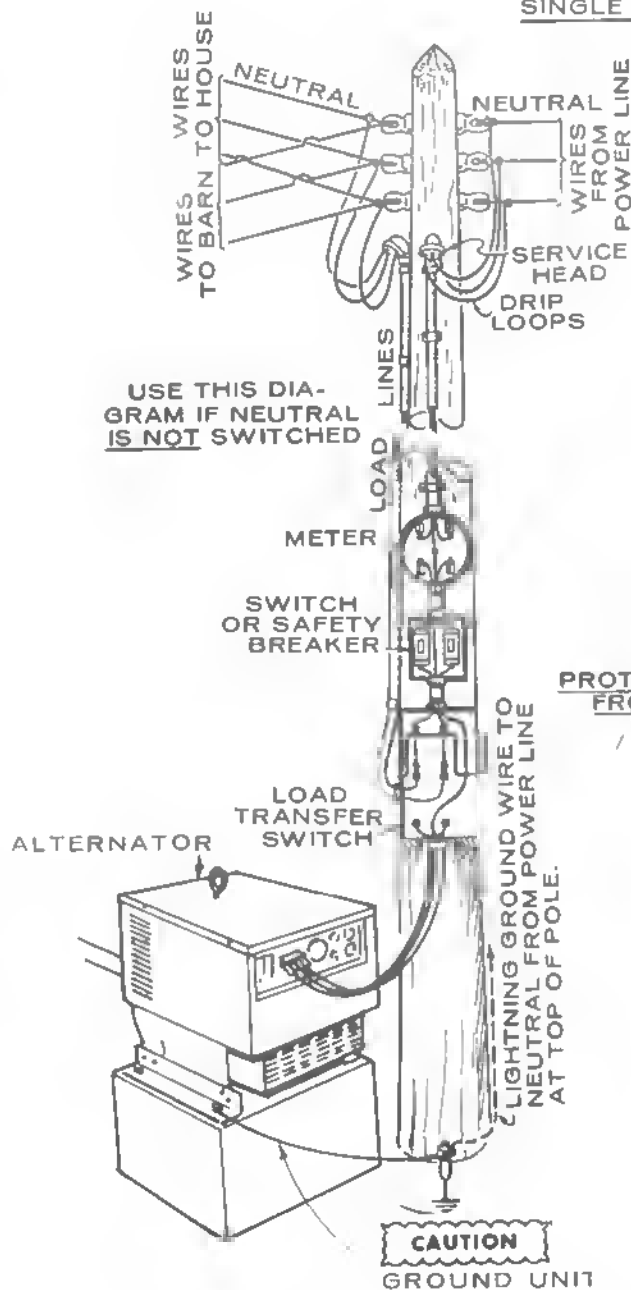
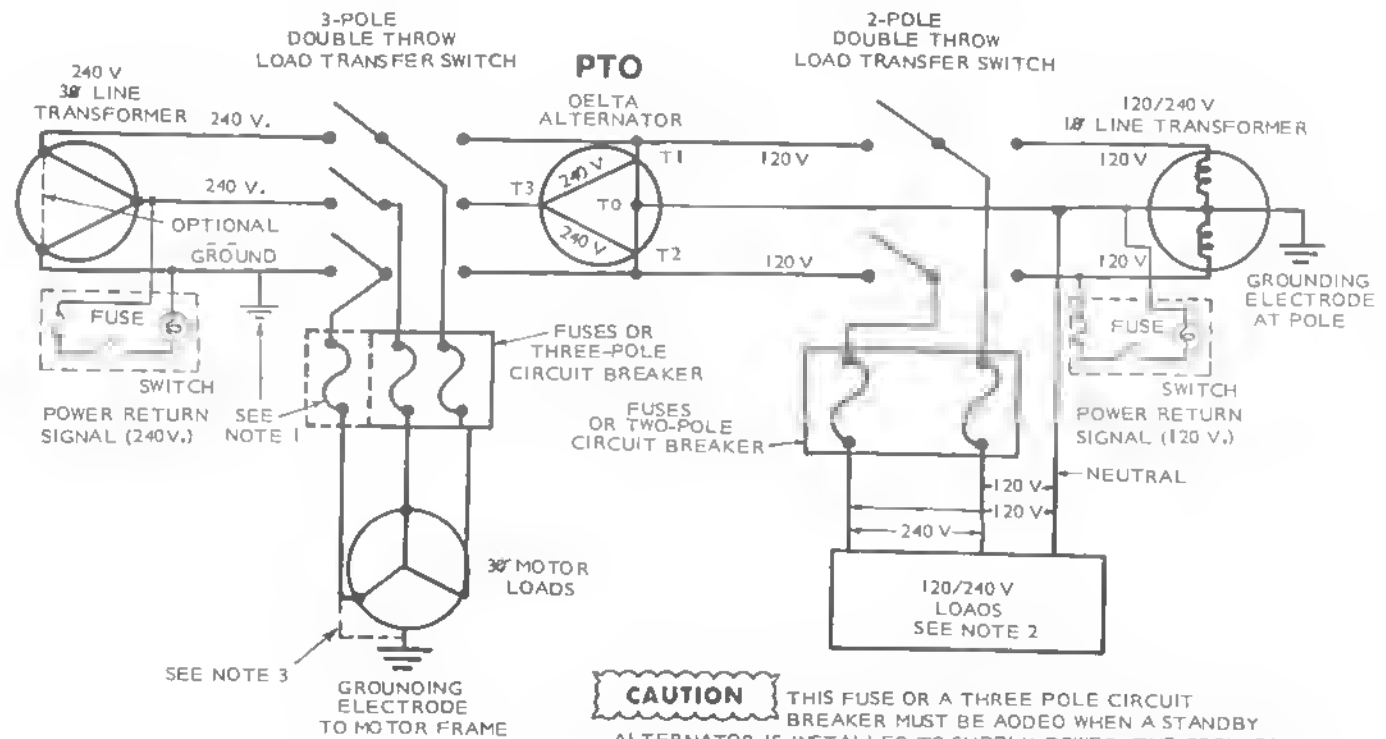
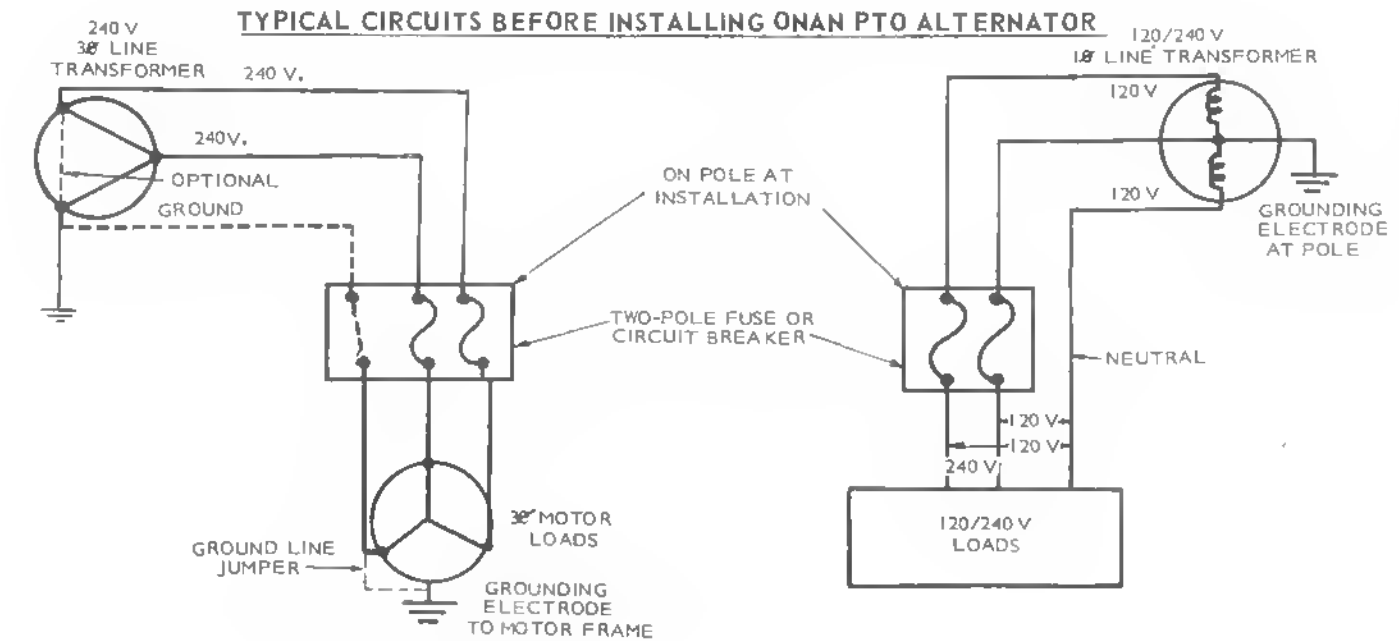


FIGURE 8. TYPICAL FARM STANDBY, SINGLE PHASE



CAUTION

THIS FUSE OR A THREE POLE CIRCUIT BREAKER MUST BE ADDED WHEN A STANDBY ALTERNATOR IS INSTALLED TO SUPPLY POWER. THE GROUNDING ELECTRODE MUST THEN BE MOVED TO THE UTILITY SIDE OF THE FUSE OR CIRCUIT BREAKER.

WARNING

CHECK ALL LOADS FOR GROUNDS WITH AN OHMMETER BEFORE CONNECTING ALTERNATOR TO LOAD TO BE SURE THE MOTORS ARE ELECTRICALLY SAFE FROM SHOCKS DUE TO INSULATION FAILURES.

WARNING

REMOVE ALL GROUNDLINE JUMPERS, BUT GROUND THE FRAME OF ALL MOTORS TO EARTH TO BE SURE PERSONNEL ARE SAFE FROM ELECTRICAL SHOCKS DUE TO INSULATION FAILURES.

FIGURE 9. COMBINATION SINGLE AND THREE-PHASE LOAD TRANSFER

INSTALLATION OF LOAD CABLE PLUG KITS

The YD PTO Alternators are factory equipped with either a single phase or a three phase output receptacle. The alternator single phase load cable connector will only accept the single phase cable assembly plug. The alternator three phase load cable connector will accept either the single or the three phase cable assembly plugs to provide either single or three phase power from a three phase alternator. The matching cable connectors supplied in Connector Housing Accessory Kit for single phase and three phase units require assembly to the customer's cable unless a complete cable is ordered with the alternator.

GENERAL

Field assembly of the cable connectors supplied in the above kits requires a heavy duty crimping tool or a high heat soldering iron. A torch is not recommended for soldering by inexperienced personnel for two reasons. First, the flame heat will burn the insulation from the cable; second, an excessive amount of solder may accumulate on the outside of the terminal preventing proper insertion of the terminal into the plug.

ASSEMBLY

1. Remove one inch of insulation from end of each cable for proper metal-to-metal contact with terminal end.
2. If a heavy duty crimping tool is available, insert wire end fully into terminal as shown in Figure 10 for No. 2 and No. 4 wire. Then crimp terminal onto wire to make a good electrical connection. Crimp each terminal and wire end in the same way.

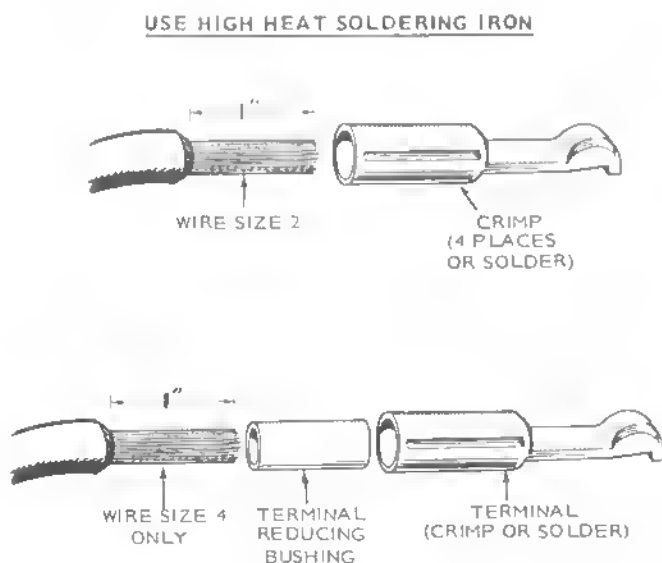


FIGURE 10. CABLE WIRE TO TERMINAL CONNECTIONS

WARNING

Use care with soldering iron and heated material to avoid being burned.

3. If a high heat soldering iron is used, proceed as follows:
 - a. Insert wire end fully into terminal as shown in Figure 10 for No. 2 and No. 4 wire. Use reducing sleeve with No. 4 wire. Hold wire and terminal horizontal while soldering, if possible.
 - b. Apply heat from soldering iron at center of terminal sleeve until heat draws solder into terminal around wire.
 - c. Add only enough solder to fill space in and around wire to make a good electrical connection.
 - d. Using a clean rag, wipe excess solder accumulation, if any, from outside of terminal for a smooth finish. Otherwise the terminal may not fit into the connector housing. Solder each terminal and wire in the same way.
 - e. Assemble cable terminal ends into plug housing assembly as indicated in Figure 11. The terminal just snaps into the plug and is retained by a flat spring.

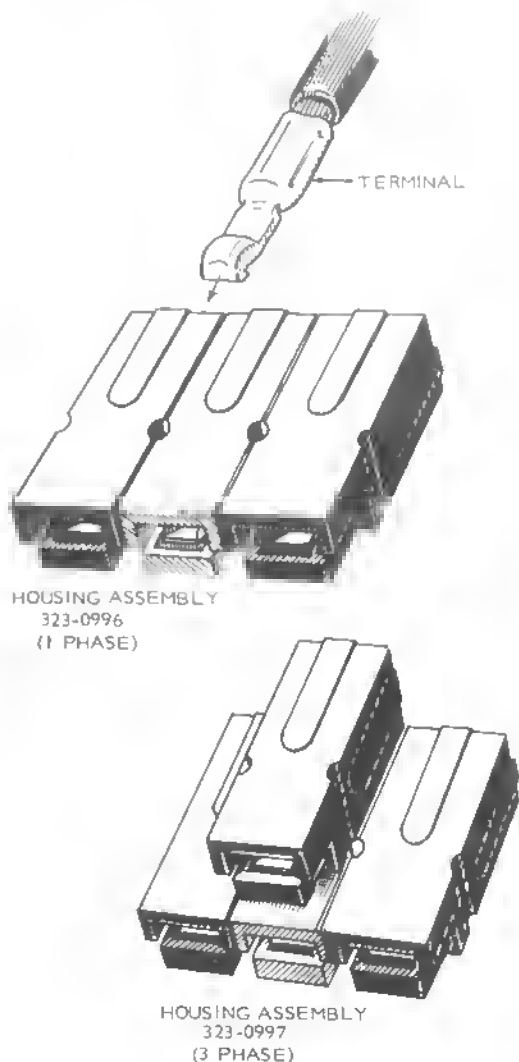


FIGURE 11. SINGLE AND THREE PHASE PLUGS

Each terminal can be removed from the plug by using a thin blade to release the terminal while a slight pull is made on the cable, Figure 12.

4. The cable and plug are now ready for mating with the receptacle on the alternator as soon as the other end of the cable is attached to the power pole transfer switch. See Figure 8.

For a safe and proper connection, be sure the neutral cable connects to the white plug at the center of the housing for proper mating to the white receptacle on the PTO Alternator.

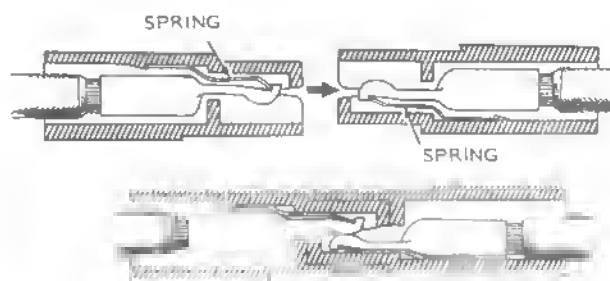


FIGURE 12. CONNECTOR HOUSING AND TERMINAL CONNECTION DETAILS

WARNING

ENGINE EXHAUST GAS (CARBON MONOXIDE) IS DEADLY!

Carbon monoxide is an odorless, colorless gas formed by incomplete combustion of hydrocarbon fuels. Carbon monoxide is a dangerous gas that can cause unconsciousness and is potentially lethal. Some of the symptoms or signs of carbon monoxide inhalation are:

- Dizziness
- Intense Headache
- Weakness and Sleepiness
- Vomiting
- Muscular Twitching
- Throbbing in Temples

If you experience any of the above symptoms, get out into fresh air immediately.

The best protection against carbon monoxide inhalation is a regular inspection of the complete exhaust system. If you notice a change in the sound or appearance of exhaust system, shut the unit down immediately and have it inspected and repaired at once by a competent mechanic.

OPERATION

STANDBY OPERATION

When a power outage occurs, the alternator should be ready to run and to take over the electrical load, Figure 13.

1. Set up tractor and install PTO shaft. Depress spring loaded pin on PTO shaft at alternator end of drive shaft. Slide yoke onto alternator PTO shaft making sure spring loaded pin falls onto groove on alternator splined shaft.

WARNING Be sure all power shields and guards are in place and secured before starting unit to prevent possible injuries to personnel.

2. Position alternator circuit breaker to OFF.
3. If alternator is mounted on a trailer for portable use, connect power leads between receptacles or alternator and load.
4. Throw transfer switch to disconnect commercial power and connect load to alternator, Figures 8 and 9.
5. Turn power return signal ON, if one has been installed.

WARNING

To avoid injury to the operator, be sure tractor range shift lever is in the **PARK** position before dismounting tractor or operating alternator.

6. Start tractor, engage power take-off, and bring PTO shaft speed up to 540-600 rpm.
7. With alternator running, position alternator circuit breaker to ON position. At 600 rpm (PTO) the voltmeter on the alternator control box reads about 250 volts (in the green range on voltmeter).
8. Various electrical loads can now be connected.

When two or more single phase circuits are available, do not overload any one circuit—divide the load equally among them.

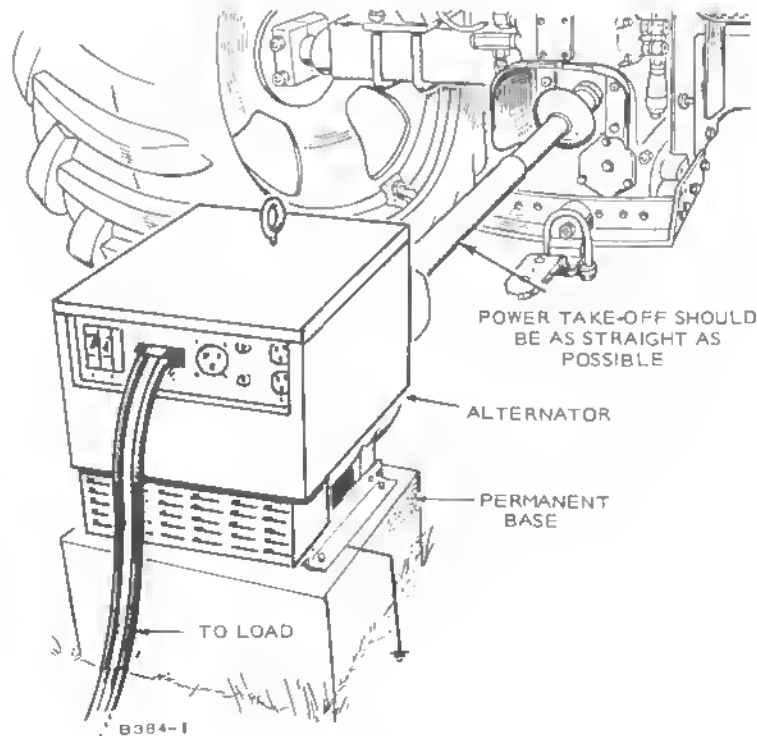


FIGURE 13. TRACTOR CONNECTION

APPLYING LOAD TO ALTERNATOR

When connecting motor loads, connect one motor at a time allowing each motor to reach running speed before connecting the next one. Motors require much more current for starting than for running at normal speed. If several motors are started at the same time, the total electrical load may overload the alternator, tripping the circuit breaker. Remove the load before throwing the circuit breaker back to the ON position.

Keep the alternator load within its nameplate rating. If the alternator is seriously overloaded, the circuit breaker will automatically trip, disconnecting the entire electrical load. Reduce the load before throwing the circuit breaker to the ON position.

If the tractor engine has very little reserve power, it may be necessary to change the engine throttle if large changes occur in the electrical system.

CAUTION These alternators require the following engine horsepower at the PTO shaft: 15 kW - 30 HP, 20 kW - 35 HP, 25 kW - 45 HP, 30 kW - 55 HP. If the tractor has little reserve power the governor may not act quickly enough when the electrical load is removed. This could cause a surge of speed and high voltage which may damage any electrical equipment left connected.

When disconnecting large portions of the load, disconnect one piece of equipment at a time, or first disconnect that part of the load which will be left on. Then remove the rest of the load. Wait until voltage has stabilized, then reconnect the portion of the load which will be left on. The alternator voltage will remain stabilized and the tractor engine speed will not change or surge enough to cause any damage if this procedure is followed.

LOAD REQUIREMENTS

Add up all of the wattage requirements of all electrical equipment that could be operating simultaneously during a power outage. Take the information either from typical wattage requirements (Table 1) or from the nameplate on the equipment itself. Compare the total load requirements with the output rating of the alternator to determine how motor starting and total load will affect the alternator.

Check the motor nameplates for the horsepower rating of essential equipment: oil burner pump, furnace blower motor, circulating heater, electric milking machine, milk pump, barn cleaner, feed conveyor, silage unloader, chick brooder, sump pump, well pump, poultry house ventilating fan, freezer, refrigerator, washing machine, etc.

Start motors one at a time, beginning with the largest one. Then, after all motors are running, there will be extra power for other less critical equipment such as a television.

ALTERNATOR SPEED

Low input speed to the alternator causes low voltage and frequency. For example: if an 1800 rpm alternator is slowed to 1500 rpm, the frequency of the current produced will be 50 hertz instead of 60 hertz.

CAUTION The low voltage and low frequency combination could result in burned output windings in any motor connected to the alternator such as refrigerators, silo unloader, feeder, etc. Undervoltage will not damage fans, blowers, or pump motors, but will cause a TV set picture to roll or have a smaller picture than normal.

TABLE 1.
TYPICAL WATTAGE REQUIREMENTS

MOTORS* (Capacitor Type)	WATTS REQUIRED	
	START	RUN
1/2 horsepower	2800	550
3/4 horsepower	4300	775
1 horsepower	5500	1000
2 horsepower	7130	1960
3 horsepower	10350	2970
5 horsepower	16660	3500
7-1/2 horsepower	23000	5250

* Repulsion-induction motors require less starting wattage. Split phase motors require slightly more starting wattage.

POWER REQUIREMENTS

Item	Approx. Wattage
Refrigerator	600-1000
Dishwasher	1000-1800
Water Heater	1500-5000
Space Heater	1000-1500
Television	200-600
Electric Drill	250-750
Water Pump	450-1000
Range Top (per element)	3000-4000
Food Freezer	300-800
Brooders	500-1000
Stock Tank Heater	300-1400

PERIODIC MAINTENANCE

PERIODIC SERVICE AND INSPECTION

Follow a regular schedule of inspection and servicing. Make a good visual check before, while, and after alternator is operating; look for loose or broken leads and bad connections.

GEAR BOX LUBRICATION

Use only SAE 90 EP multi-purpose gear lubricant. Drain the gear box after the first 100 hours of operation and refill with fresh lubricant of the recommended grade. Repeat this procedure each year thereafter, or every 250 hours. Maintain the proper oil level between changes.

CAUTION

Overfilling will cause foaming, which can lead to an oil leak.

Remove oil fill plug at top of the case and oil level plug from the face of the gear case, Figure 14. Fill case until oil flows from the oil level plug hole. Gear box holds 1 pint (0.47 litre) U.S. measure. Replace both plugs.

PTO SHAFT LUBRICATION

Grease the universal joints and telescoping shafts on the PTO shaft at least every 25 operating hours. Under adverse conditions, grease the joints as required, possibly every 4 to 8 hours.

WARNING

For personnel safety, never operate the alternator with the protective guards removed from the PTO shaft.

BEARINGS

The ball-type shaft bearing on the cover end and on the gear box end are lubricated by the gear box lubricant (SAE 90EP).

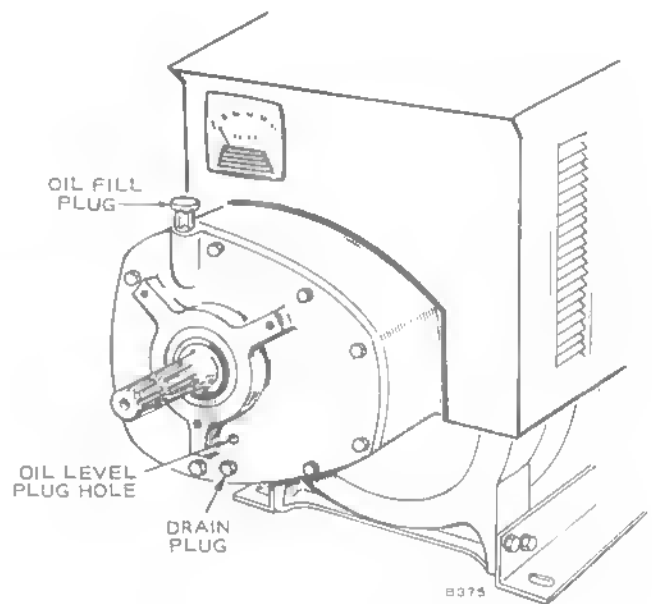


FIGURE 14. GEAR BOX LUBRICATION

TROUBLESHOOTING

A few simple checks and a proper troubleshooting procedure can locate the probable source of trouble and cut down troubleshooting time.

1. Check all modifications, repairs, and replacements performed since last satisfactory operation of set to be sure that connection of generator leads are correct. A loose wire connection, overlooked when installing a replacement part could cause problems. An incorrect connection, an opened circuit breaker, or a loose printed circuit board are all potential malfunction areas to be eliminated by a visual check.
2. Unless absolutely sure that panel instruments are accurate, use portable test meters for troubleshooting.
3. Visually inspect components on voltage regulator. Look for dirt, dust, moisture and cracks in the printed solder conductors. Burned resistors, arcing tracks are all identifiable. Do not mark on printed circuit boards with a pencil. Graphite lines are conductive and can cause short circuits between components.

TROUBLESHOOTING

NATURE OF TROUBLE	POSSIBLE CAUSE	REMEDY
Alternator Overheats	1. Windings and parts covered with dirt and oil.	1. Disassemble alternator and clean.
	2. Air intake is restricted or incoming air too hot.	2. Clean alternator air intake and outlet areas.
	3. Overloaded.	3. Remove part of load.
Noisy Alternator	1. Alternator loose on base.	1. Tighten mounting bolts.
	2. Defective bearing.	2. Replace. Check alignment.
No Voltage Output	1. Voltage regulator trouble, or open, short or grounded circuit in alternator.	1. Call your Equipment Service Center.
	2. Alternator leads broken or loose.	2. Tighten connections and replace broken leads.
	3. Load circuit breaker in tripped position.	3. Remove part of load and reset circuit breaker.
	4. Open circuit of field or stator winding.	4. Make proper connections.
	5. Short circuit of winding in the field or stator.	5. Call your Equipment Service Center.
Low Voltage Output of Alternator	1. External short circuit on line.	1. Test alternator with line wires disconnected.
	2. Incorrect PTO speed.	2. Readjust PTO speed to 540 to 600 rpm.

PARTS CATALOG

INSTRUCTIONS FOR ORDERING REPAIR PARTS

For parts or service, contact the dealer from whom you purchased this equipment or refer to your Nearest Authorized Parts and Service Center.

To avoid errors or delay in filling your parts order, please furnish all information requested.

Always refer to the nameplate on your unit:

1. Always give the MODEL and SPEC NO. and SERIAL NO.

AGRO Power, INC.
BOX 892
FOND DU LAC, WISCONSIN 54935

SERIAL NO. [REDACTED]

IMPORTANT. ALWAYS GIVE ABOVE NOS.
WHEN ORDERING PARTS

AC VOLTS [REDACTED] PH [REDACTED]
KVA [REDACTED] KW [REDACTED]
PF [REDACTED] AMPS [REDACTED] Hz [REDACTED]
INSUL-NEMA CLASS [REDACTED] F AMB. 40°C
TIME RATING [REDACTED]
RPM [REDACTED] BAT [REDACTED]
FOR ELEC. [REDACTED] LR 3927
EQPT ONLY [REDACTED]

99 1317

For handy reference, insert "YOUR" nameplate information in the spaces above.

2. Do not order by reference number or group number; always use part number and description.
3. Give the part number, description and quantity needed of each item. If an older part cannot be identified, return the part prepaid to your dealer or nearest AUTHORIZED SERVICE STATION. Print your name and address plainly on the package. Write a letter to the same address stating the reason for returning the part.
4. State definite shipping instructions. Any claim for loss or damage to your unit in transit should be filed promptly against the transportation company making the delivery. Shipments are complete unless the packing list indicates items are back ordered.

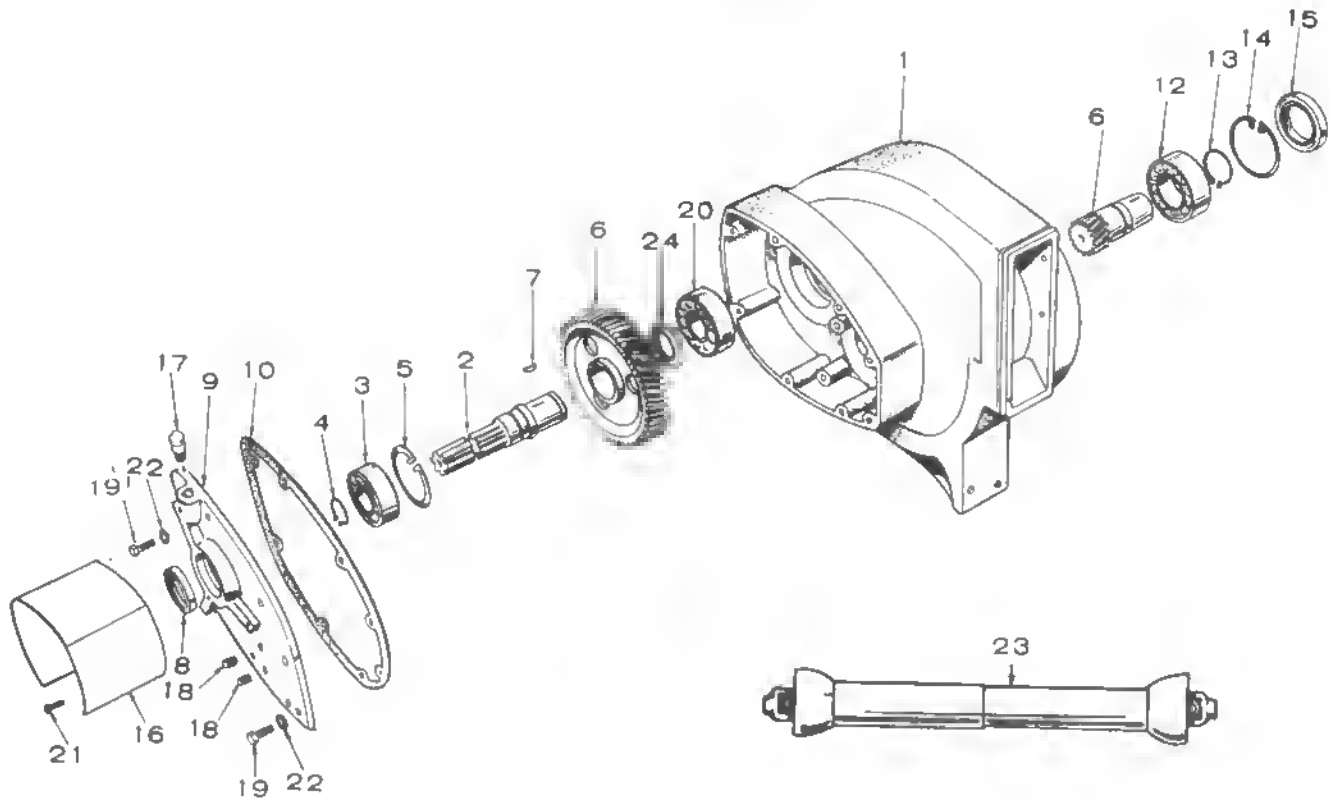
Prices are purposely omitted from this Parts Catalog due to the confusion resulting from fluctuating costs, import duties, sales taxes, exchange rates, etc.

For current parts prices, consult your Dealer, Distributor or Parts and Service Center.

"En esta lista de partes los precios se omiten de proposito, ya que bastante confusion resulto de fluctuaciones de los precios, derechos aduanales, impuestos de venta, cambios extranjeros, etc."

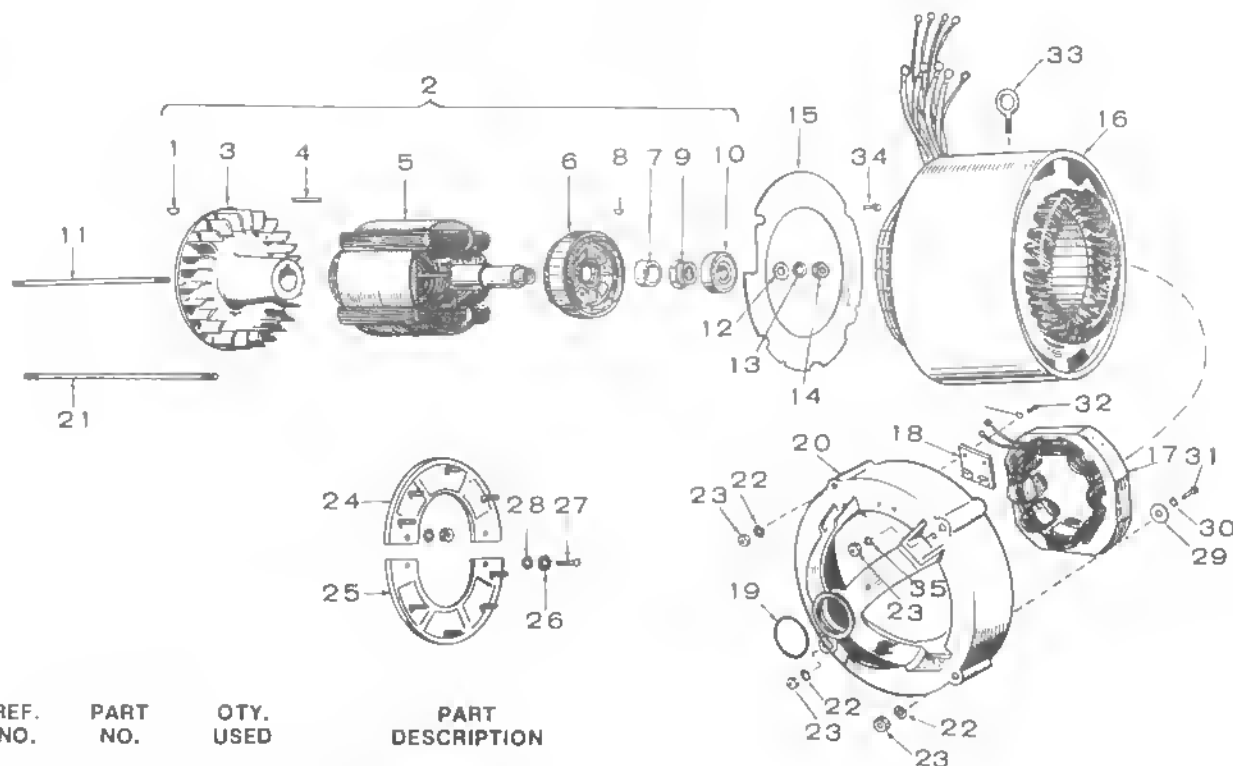
Consiga los precios vigentes de su distribuidor de productos

GEARBOX



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	231-0184	1	Adapter and Gear Drive Case
2	190-0409	1	Shaft, Input Gear
3	510-0114	1	Bearing, Ball - Input Shaft
4	518-0122	1	Ring, Retaining - External
5	518-0287	1	Ring, Retaining - Internal
6	190-0437	1	Gear, Set
7	515-0141	1	Key, Drive Gear to Shaft
8	509-0138	1	Seal, Oil - Bearing Plate
9	190-0408	1	Plate, Bearing
10	103-0451	1	Gasket, Bearing Plate
12	510-0113	1	Bearing, Ball - Output Shaft
13	518-0333	1	Ring, Retaining - External
14	518-0334	1	Ring, Retaining - Internal
15	509-0139	1	Seal, Oil - Output Shaft
16	190-0384	1	Guard, Power Take-Off
17	518-0275	1	Vent and Fill Plug
18	502-0028	2	Plug, Drain and Oil Level Brass
19	800-0029	8	Screw, Cap - Hex Head (5/16-18 x 1-1/8")
20	510-0117	1	Bearing, Ball - Input Shaft
21	821-0014	3	Screw, Cap - Hex Head Locking Flange (5/16-18 x 1/2")
22	850-0045	8	Washer, Lock - Spring (5/16")
23	ROD, TUMBLING - OPTIONAL EQUIPMENT		
	190-0467	1	Optional Equipment for 15 kW Alternators
	190-0446	1	Heavy Duty Optional Equipment For 15, 20, 25 and 30 kW Alternators
24	526-0269	1	Washer, Flat (1.78 ID x 2.25 OD x .125 Thk)

ALTERNATOR



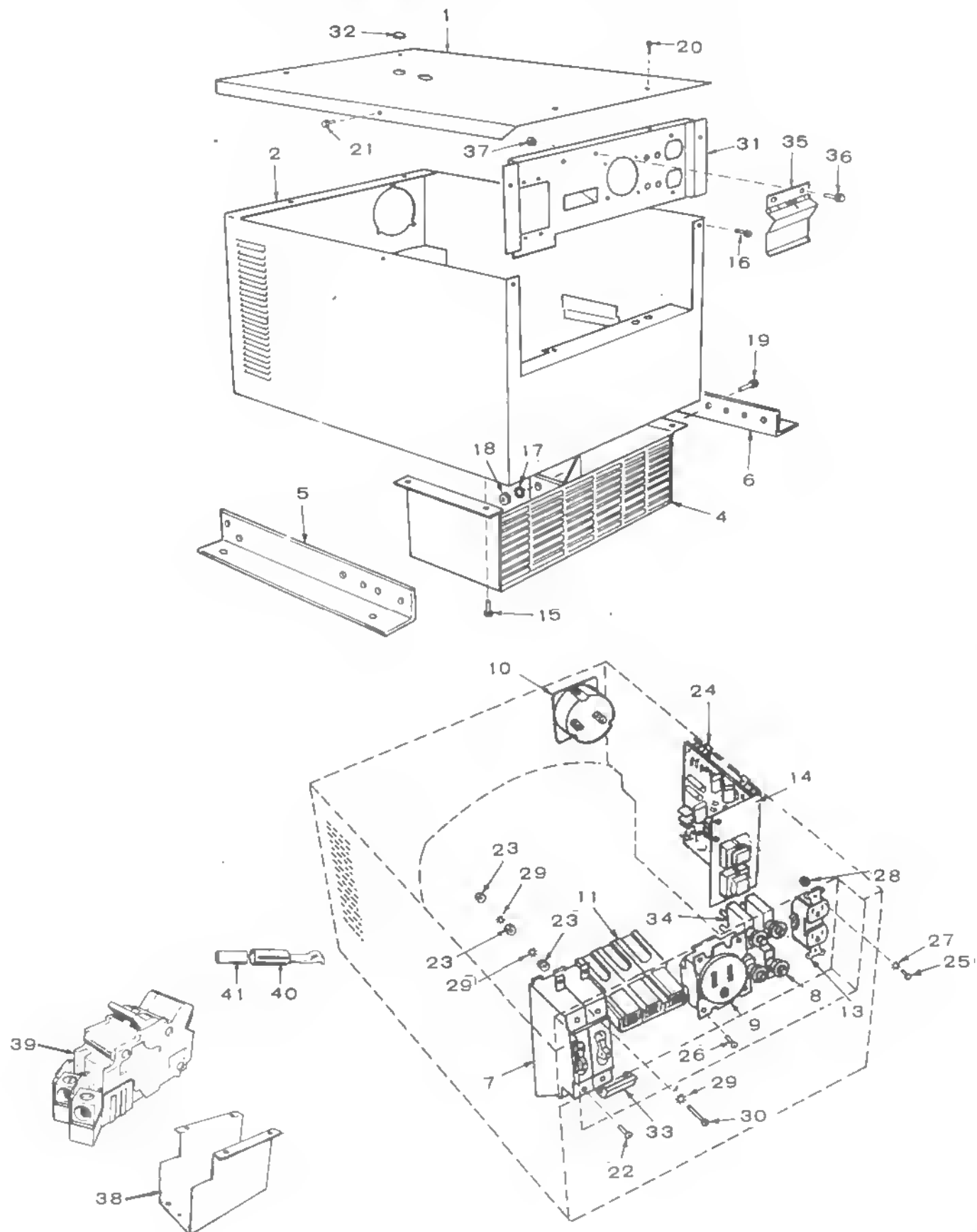
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	515-0124	1	Key, Alternator to Gear Box Output Shaft
2	ROTOR ASSEMBLY (Includes Parts Marked *)		
	201-2157	1	15 kW Alternator
	201-2159	1	20 kW Alternator
	201-2160	1	25 kW Alternator
	201-2446	1	30 kW Alternator
3	205-0105	1	*Fan, Generator
4	515-0103	1	*Key, Blower Fan
5	*ROTOR, WOUND		
	201-2052	1	15 kW Alternators
	201-2054	1	20 kW Alternators
	201-2055	1	25 kW Alternators
	201-2439	1	30 kW Alternators
6	*ROTOR ASSEMBLY, WOUND EXCITER (Includes Parts Marked #)		
	201-2151	1	15, 20, 25 kW Alternators
	201-2152	1	30 kW Alternators
7	232-2398	1	*Spacer, Bearing
8	515-0094	1	*Key, Exciter Rotor
9	870-0284	1	*Nut, Locking (Nylon Insert)
10	510-0112	1	*Bearing, Rotor
11	STUD, ROTOR THROUGH		
	520-0789	1	15 kW Alternators
	520-0791	1	20 kW Alternators
	520-0792	1	25 kW Alternators
	520-0858	1	30 kW Alternators
12	232-0200	1	Washer, Cone Shaped Rotor Through Stud
13	850-0055	1	Washer, Lock - Spring (7/16")
14	870-0203	1	Nut, Hex (7/16-20)
15	234-0519	1	Baffle, Air
16	STATOR ASSEMBLY, WOUND		
	220-2354	1	15 kW
	220-2740	1	20 kW Single Phase Alternators
	220-2989	1	20 kW Three Phase Alternators
	220-2355	1	25 kW Single Phase Alternators
	220-2356	1	25 kW Three Phase Alternators
	220-2595	1	30 kW Alternators

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
17	STATOR, WOUND - EXCITER		
	220-2009	1	15, 20, 25 kW Alternators
	220-2010	1	30 kW Alternators
18	232-2418	1	Board, Connection
19	509-0094	1	Seal, "O" Ring - Bearing
20	211-0256	1	Bell, End
21	STUD, ALTERNATOR THROUGH		
	520-0797	4	15 kW Alternators
	520-0799	4	20 kW Alternators
	520-0800	4	25 kW Alternators
	520-0801	4	30 kW Alternators
22	850-0050	3	Washer, Lock - Spring (3/8")
23	862-0011	4	Nut, Hex (3/8-16)
24	358-0069	1	#Diode and Heat Sink Assembly - (Positive)
25	358-0070	1	#Diode and Heat Sink Assembly - (Negative)
26	853-0008	4	#Washer, Lock - ET (#10)
27	813-0100	4	#Screw, Machine - Round Head (#10-32 x 1/2")
28	526-0008	4	#Washer, Flat (13/64" ID x 7/16" OD x 1/32" Thk)
29	526-0260	2	Washer, Flat (.28" ID x 1.25" OD x 10 Gauge)
30	853-0013	2	Washer, Lock - ET (1/4")
31	800-0004	2	Screw, Cap - Hex Head (1/4-20 x 5/8")
32	815-0194	2	Screw, Cap - Hex Head W/ET (#10-32 x 3/16")
33	403-0095	1	Bolt, Eye - Lifting
34	821-0008	4	Screw, Cap - Hex Head (1/4-20 x 5/16")
35	856-0010	2	Washer, Lock - EIT (3/8")

* - Included in complete Rotor Assembly.

- Included in 201-2151 Exciter Rotor Assembly.

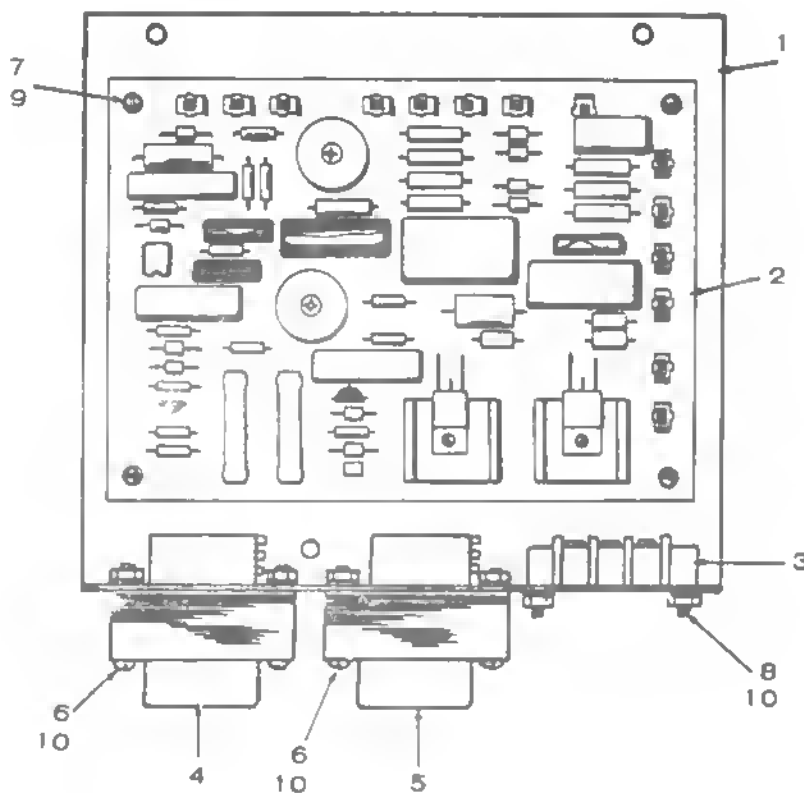
HOUSING, MOUNTING FEET AND CONTROL



HOUSING, MOUNTING FEET AND CONTROL

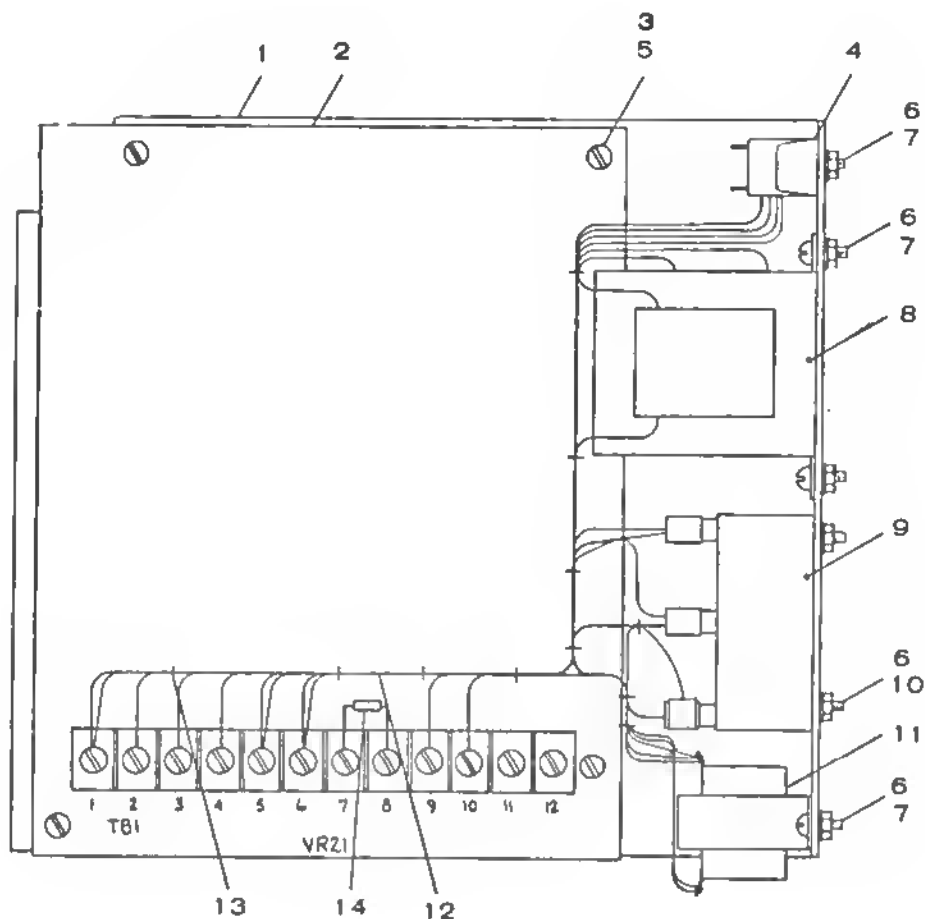
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	COVER, CONTROL BOX			11	HOUSING, CONNECTOR		
	301-3887	1	15 and 25 kW Alternators		323-0996	2	Single Phase Alternators
	301-4558	1	20 kW Alternators		323-0997	2	Three Phase Alternators
	301-4563	1	30 kW Alternators	12	856-1006	4	Washer, Lock - EIT (5/16")
2	BOX, CONTROL			13	RECEPTACLE, DUPLEX		
	301-3886	1	15, 20 and 25 kW Alternators		323-0184	1	Three Phase Alternators
	301-4561	1	30 kW Alternators		323-0383	1	Single Phase Alternators
4	GRILLE, AIR INLET			14	REGULATOR ASSEMBLY, VOLTAGE (See Separate Group for Components)		
	234-0537	1	15 kW Alternators		305-0534	1	15, 20 and 25 kW Alternators
	234-0579	1	20 kW Alternators		305-0579	1	30 kW Alternators
	234-0538	1	25 and 30 kW Alternators	15	821-0010	4	Screw, Cap - Hex Head Locking (1/4-20 x 1/2")
5	FOOT, MOUNTING - ALTERNATOR (Right Side)			16	821-0008	2	Screw, Cap - Hex Head Locking (1/4-20 x 5/16")
	232-2454	1	15 and 25 kW Alternators	17	850-0055	8	Washer, Lock - Spring (7/16")
	232-2655	1	20 and 30 kW Alternators	18	862-0004	4	Nut, Hex (7/16-14)
6	FOOT, MOUNTING - ALTERNATOR (Left Side)			19	800-0071	8	Screw, Cap - Hex Head (7/16-14 x 1")
	232-2455	1	15 and 25 kW Alternator	20	821-0010	4	Screw, Cap - Hex Head Locking (1/4-20 x 1/2")
	232-2656	1	20 and 30 kW Alternator	22	812-0059	4	Screw, Machine - Round Head (#6-32 x 1/4") (NOTE: 6 used on Three Phase Alternators)
7	BREAKER, CIRCUIT			23	871-0010	12	Nut, Hex - Brass (#10-32) (NOTE: 18 used on Three Phase Alternators)
	320-0366	2	65 Ampere (15 kW Alternators Prior to Serial #770252190)	24	518-0343	2	Clip, Regulator Assembly Mounting
	320-0629	1	65 Ampere (15 kW Alternator Begin Serial #770252190)	25	812-0079	2	Screw, Machine - Round Head (#8-32 x 1/2")
	320-0633	1	85 Ampere (20 kW Single Phase Alternators)	26	812-0059	4	Screw, Machine - Round Head (#6-32 x 1/4")
	320-0641	1	75 Ampere (20 kW Three Phase Alternators)	27	853-0005	2	Washer, Lock - ET (#8)
	320-0251	2	100 Ampere (25 kW Single Phase Alternators - Prior to Serial #770252190)	28	860-0008	2	Nut, Hex (#8-32)
	320-0632	1	100 Ampere (25 kW Single Phase Alternators - Begin Serial #770252190)	29	853-0008	4	Washer, Lock - ET (#10) (NOTE: 6 used on Three Phase Alternators)
	320-0367	3	75 Ampere (25 kW Three Phase Alternators - Prior to Serial #770252190)	30	811-0103	4	Screw, Machine - Round Head Brass (#10-32) (NOTE: 6 used on Three Phase Alternators)
	320-0641	1	75 Ampere (25 kW Three Phase Alternators - Begin Serial #770252190)	31	PANEL, CONTROL GROUP		
	320-0642	1	90 Ampere (30 kW Three Phase Alternators)		301-4189	1	15, 20 and 25 kW Single Phase Alternators
8	BREAKER, CIRCUIT				301-3983	1	30 kW Single Phase Alternators
	320-0527	1	2 Ampere (30 kW Single Phase Alternators)		301-4191	1	20, 25 and 30 kW Three Phase Alternators
	320-0505	1	3 Ampere (15, 20, and 25 kW Alternators)	32	517-0022	1	Plug, DOL Button
	320-0505	1	3 Ampere (30 kW Three Phase Alternators)	33	LOCK, CIRCUIT BREAKER HANDLE - Prior to Serial #770252190		
	320-0540	1	15 Ampere		320-0187	1	Three Phase Alternators
9	323-0894	1	Receptacle, Output		320-0202	1	Single Phase Alternators
10	302-0551	1	Voltmeter (0-300 Volts)	34	320-0548	2	Breaker, Circuit - 50 Ampere
				35	301-4233	1	Cover, Load Plug
				36	821-0004	2	Screw, Cap - Hex Head Locking (#10-32 x 5/16")
				37	870-0320	2	Nut, Hex - Locking (#10-32)
				38	301-3985	1	Bracket, Circuit Breaker 30 kW Single Phase Alternators
				39	320-0580	1	Breaker, Circuit (125 Ampere) 30 kW Single Phase Alternators
				40	TERMINAL, CONNECTOR		
					332-1880	6	Single Phase Alternators
					332-1880	8	Three Phase Alternators
				41	332-1881	8	Three Phase Alternators

VOLTAGE REGULATOR (15, 20 AND 25 kW ALTERNATORS)



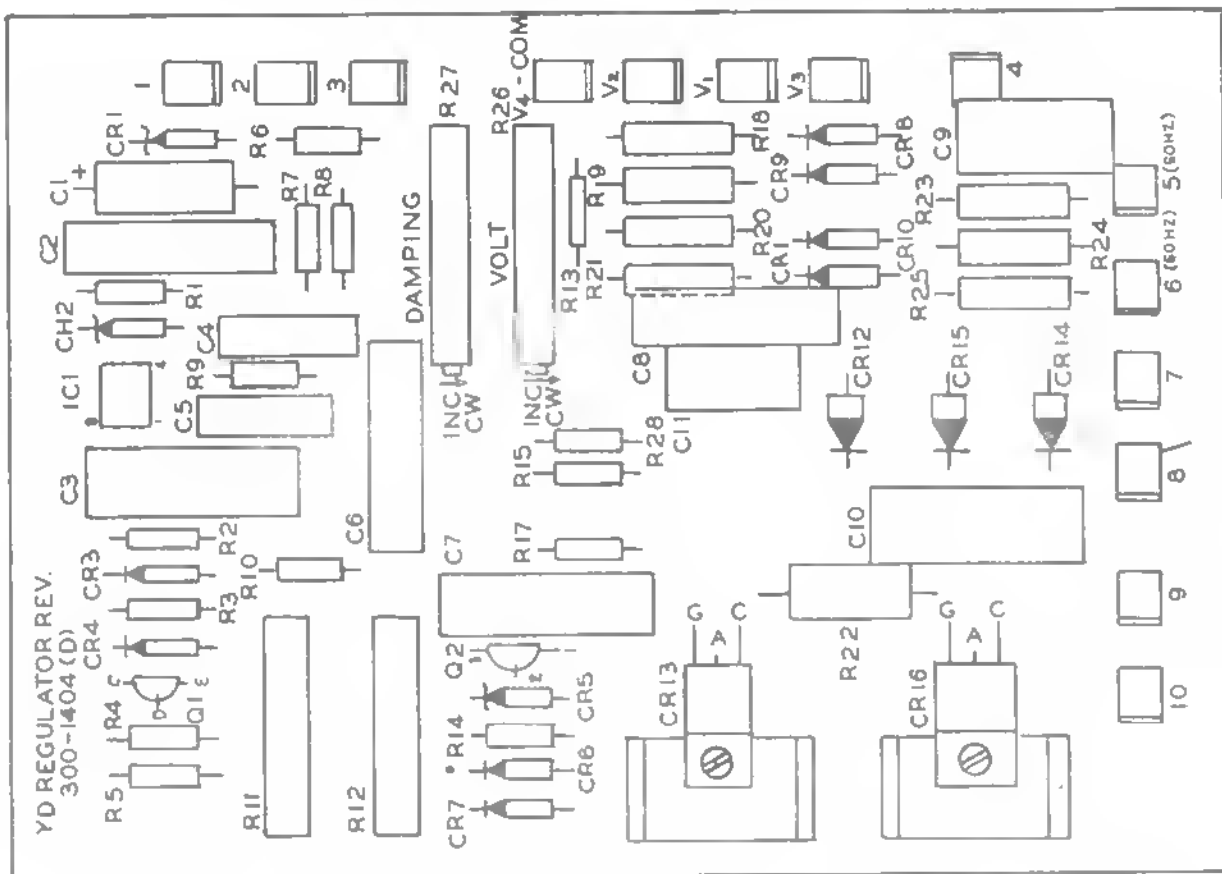
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	305-0534	1	Regulator Assembly, Voltage (Complete)
1	307-3719	1	Panel, Voltage Regulator Mounting
2	300-1404	1	Board Assembly, Regulator - (See Separate Group for Components)
3	332-1655	1	Strip, Terminal
4	315-0386	1	Transformer, Voltage
5	315-0391	1	Reactor
6	812-0070	4	Screw, Round Head Machine (#6-32 x 1-1/4")
7	812-0061	4	Screw, Round Head Machine (#6-32 x 3/8")
8	812-0063	2	Terminal Strip Mounting (#6-32 x 1/2")
9	853-0003	4	Washer, Lock - ET (#6)
10	870-0183	6	Nut, Hex - With ET (#6-32)

VOLTAGE REGULATOR (30 kW ALTERNATORS)



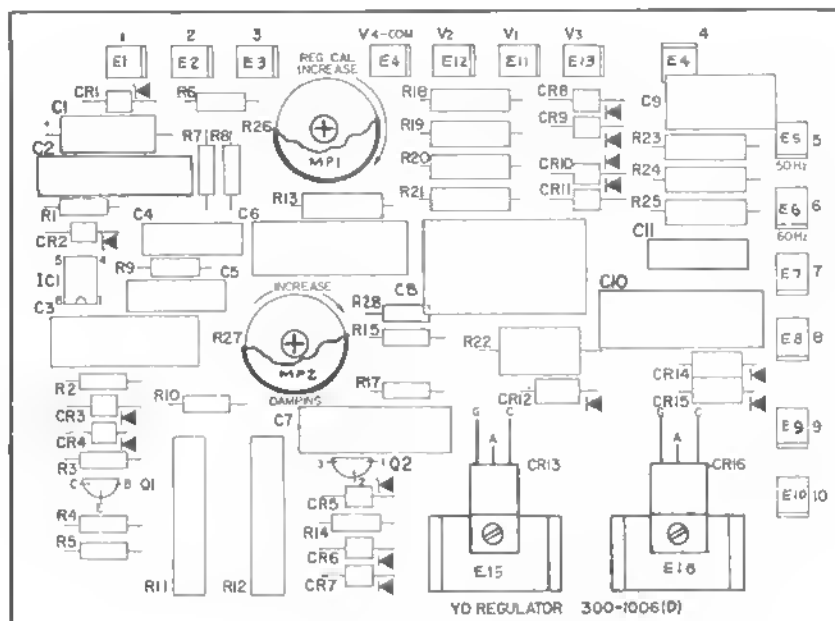
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	305-0579		Regulator, Voltage (Complete)
1	301-4591	1	Panel, Voltage Regulator
2	332-1956	1	Board Assembly, Regulator (NOTE: See Separate Group for Components)
3	812-0059	4	Screw, Machine - Round Head (#6-32 x 1/4")
4	332-2097	1	Block, Terminal (12 Place)
5	853-0003	4	Washer, Lock - ET (#6)
6	870-0183	8	Nut, Hex W/ET (#6-32)
7	812-0061	6	Screw, Machine - Round Head (#6-32 x 3/8")
8	315-0431	1	Transformer, Voltage
9	305-0524	1	Bridge (SCR)
10	812-0070	2	Screw, Machine - Round Head (#6-32 x 1-1/4")
11	315-0343	1	Reactor Assembly
12	338-1124	1	Harness, Wiring
13	332-0942	10	Tie, Cable
14	351-0216	1	Resistor

**PRINTED CIRCUIT BOARD ASSEMBLY GROUP (300-1404)
(15, 20 AND 25 kW ALTERNATORS - BEGIN
SERIAL NUMBER #E760133373)**



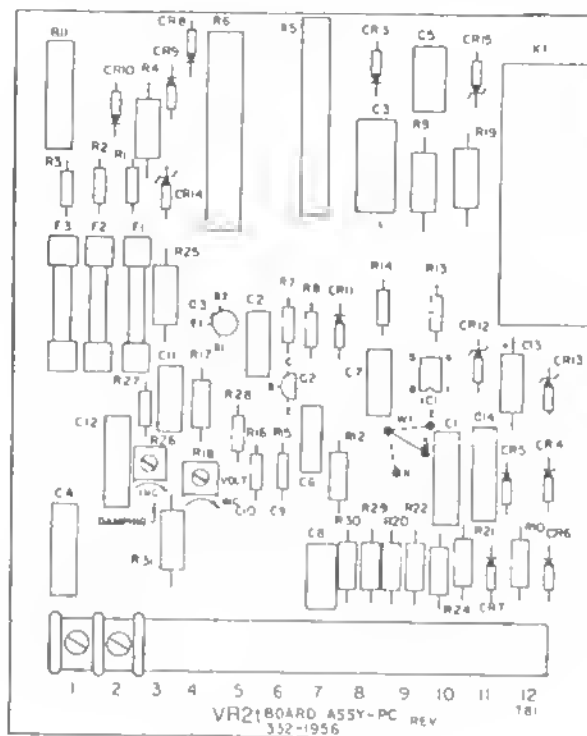
REF. NO.	PART NO.	QTY. USEO	PART DESCRIPTION	REF. NO.	PART NO.	QTY. USEO	PART DESCRIPTION
	300-1404	1	Board Assembly, Complete	R5	350-0466	1	Resistor (2 Megohm, 1/2 Watt)
C1	356-0039	1	Capacitor, Electrolytic (100 Mfd, 10 Volt)	R6	351-0202	1	Resistor, Film (1,240-Ohm, 1/4 Watt)
C2,6	355-0006	2	Capacitor (.47 Mfd, 100 Volt)	R7	350-0445	1	Resistor (270,000-Ohm, 1/2 Watt)
C3,7	355-0005	2	Capacitor (.22 Mfd, 200 Volt)	R8,10	350-0435	2	Resistor (100,000-Ohm, 1/4 Watt)
C4,5,11	355-0015	3	Capacitor (.1 Mfd, 200 Volt)	R9	350-0459	1	Resistor (1 Megohm, 1/2 Watt)
C8	355-0016	1	Capacitor (1 Mfd, 100 Volt)	R11,12	353-0048	2	Resistor, Wire Wound (4,000-Ohm, 5 Watt)
C9	355-0031	1	Capacitor (.39 Mfd, 100 Volt)	R13	351-0293	1	Resistor, Film (11,000-Ohm, 1/4 Watt)
C10	355-0017	1	Capacitor (.47 Mfd, 400 Volt)	R14	350-0363	1	Resistor (100-Ohm, 1/2 Watt)
CR1	359-0036	1	Diode, Zener (5.6 Volt)	R15,17	350-0351	2	Resistor (33-Ohm, 1/2 Watt)
CR2	359-0025	1	Diode, Zener (20 Volt)	R18	351-0332	1	Resistor, Film (28,000-Ohm, 1/4 Watt)
CR3,4,6,11	357-0004	8	Rectifier, Diode (400 Milliamp, 400 Volt)	R19	351-0240	1	Resistor, Film (3,090-Ohm, 1/4 Watt)
CR5	359-0026	1	Diode, Zener (18 Volt)	R20	351-0211	1	Resistor, Film (1,530-Ohm, 1/4 Watt)
CR12,14,15	357-0028	3	Rectifier, Diode	R21	351-0234	1	Resistor, Film (2,670-Ohm, 1/4 Watt)
CR13,16	365-0002	2	Rectifier, Gate Control	R22	350-0973	1	Resistor, Film (270-Ohm, 2 Watt)
E1-14	332-1511	14	Terminal, Lug	R23	350-0512	1	Resistor (10-Ohm, 1/2 Watt)
E15-16	363-0069	2	Heatsink, Diode	R24	351-0353	1	Resistor, Film (46,400-Ohm, 1/4 Watt)
H1	812-0029	2	Screw, Round Head (4-40 x 3/8")	R25	351-0349	1	Resistor, Film (42,200-Ohm, 1/4 Watt)
H2	526-0257	2	Washer, Flat (#4)	R26	303-0208	1	Potentiometer (20,000-Ohm)
H3	860-0003	2	Nut, Hex (4-40)	R27	303-0207	1	Potentiometer (5,000-Ohm)
IC1	367-0005	1	Integrated Circuit	R28	350-0355	1	Resistor (47-Ohm, 1/2 Watt)
MP1-2	517-0127	2	Cover, Potentiometer				
Q1	362-0017	1	Transistor, NPN				
Q2	361-0003	1	Transistor, Unijunction				
R1	350-0423	1	Resistor (33,000-Ohm, 1/2 Watt)				
R2	350-0443	1	Resistor (220,000-Ohm, 1/2 Watt)				
R3	350-0447	1	Resistor (330,000-Ohm, 1/2 Watt)				
R4	350-0398	1	Resistor (3,000-Ohm, 1/2 Watt)				

PRINTED CIRCUIT BOARD ASSEMBLY GROUP (300-1006)
(15 AND 25 kW ALTERNATORS - PRIOR TO
SERIAL NUMBER E760133373)



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	300-1006	1	Board Assembly, Complete (Order Part Number 300-1404)	R5	350-0466	1	Resistor (2 Megohm, 1/2 Watt)
C1	356-0039	1	Capacitor, Electrolytic (100 Mfd, 10 Volt)	R6	351-0202	1	Resistor, Film (1,240-Ohm, 1/4 Watt)
C2,6	355-0006	2	Capacitor (.47 Mfd, 100 Volt)	R7	350-0445	1	Resistor (270,000-Ohm, 1/2 Watt)
C3,7	355-0005	2	Capacitor (.22 Mfd, 200 Volt)	R8,10	350-0435	2	Resistor (100,000-Ohm, 1/4 Watt)
C4,5,11	355-0015	3	Capacitor (.1 Mfd, 200 Volt)	R9	350-0459	1	Resistor (1 Megohm, 1/2 Watt)
C8	355-0016	1	Capacitor (1 Mfd, 100 Volt)	R11,12	353-0048	2	Resistor, Wire Wound (4,000-Ohm, 5 Watt)
C9	355-0031	1	Capacitor (.39 Mfd, 100 Volt)	R13	351-0293	1	Resistor, Film (11,000-Ohm, 1/4 Watt)
C10	355-0017	1	Capacitor (.47 Mfd, 400 Volt)	R14	350-0363	1	Resistor (100-Ohm, 1/2 Watt)
CR1	359-0036	1	Diode, Zener (5.6 Volt)	R15,17	350-0351	2	Resistor (33-Ohm, 1/2 Watt)
CR2	359-0025	1	Diode, Zener (20 Volt)	R18	351-0332	1	Resistor, Film (28,000-Ohm, 1/4 Watt)
CR3,4,6,11	357-0004	8	Rectifier, Diode (400 Milliamp, 400 Volt)	R19	351-0240	1	Resistor, Film (3,090-Ohm, 1/4 Watt)
CR5	359-0026	1	Diode, Zener (18 Volt)	R20	351-0211	1	Resistor, Film (1,530-Ohm, 1/4 Watt)
CR12,14,15	357-0028	3	Rectifier, Diode	R21	351-0234	1	Resistor, Film (2,670-Ohm, 1/4 Watt)
CR13,16	365-0002	2	Rectifier, Gate Control	R22	350-0973	1	Resistor, Film (270-Ohm, 2 Watt)
E1-14	332-1511	14	Terminal, Lug	R23	350-0512	1	Resistor (10-Ohm, 1/2 Watt)
E15-16	363-0069	2	Heatsink, Diode	R24	351-0353	1	Resistor, Film (46,400-Ohm, 1/4 Watt)
H1	812-0029	2	Screw, Round Head (4-40 x 3/8")	R25	351-0349	1	Resistor, Film (42,200-Ohm, 1/4 Watt)
H2	526-0257	2	Washer, Flat (#4)	R26	303-0168	1	Potentiometer (5,000-Ohm)
H3	860-0003	2	Nut, Hex (4-40)	R27	303-0164	1	Potentiometer (8,000-Ohm)
IC1	367-0005	1	Integrated Circuit	R28	350-0355	1	Resistor (47-Ohm, 1/2 Watt)
MP1-2	517-0127	2	Cover, Potentiometer				
Q1	362-0017	1	Transistor (NPN)				
Q2	361-0003	1	Transistor, Unijunction				
R1	350-0423	1	Resistor (33,000-Ohm, 1/2 Watt)				
R2	350-0443	1	Resistor (220,000-Ohm, 1/2 Watt)				
R3	350-0447	1	Resistor (330,000-Ohm, 1/2 Watt)				
R4	350-0398	1	Resistor (3,000-Ohm, 1/2 Watt)				

PRINTED CIRCUIT BOARD ASSEMBLY GROUP (332-1956) **(30 kW ALTERNATORS)**



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	332-1956	1	Board Assembly, Printed - Complete	R11	352-0151	1	Resistor - Fixed 5 Watt, 15,000-Ohm
C1,14	355-0042	2	Capacitor - 47 Mfd, 250 Volt	R12	351-0909	1	Resistor - 1/2 Watt, 90,900-Ohm
C2, C7	355-0043	2	Capacitor - 22 Mfd, 250 Volt	R13	350-0411	1	Resistor - 1/2 Watt, 10,000-Ohm
C3	355-0047	1	Capacitor - 47 Mfd, 400 Volt	R14	350-0443	1	Resistor - 1/2 Watt, 220,000-Ohm
C4, C12	355-0044	2	Capacitor - 47 Mfd, 250 Volt	R15, R27	350-0435	2	Resistor - 1/2 Watt, 100,000-Ohm
C5, C8	355-0046	2	Capacitor - 1 Mfd, 100 Volt	R17	351-0521	1	Resistor, Metal Film - 1/4 Watt, 12,100-Ohm
C6	355-0056	1	Capacitor - .33 Mfd, 250 Volt	R18	303-0210	1	Potentiometer - 5,000-Ohm, 1/2 Watt
C11	355-0048	1	Capacitor - 1 Mfd, 400 Volt	R20, 22			
C13	356-0039	1	Capacitor - Electrolytic 100 Mfd, 10 Volt	29 & 30	351-0520	4	Resistor - 1/4 Watt, 28,000-Ohm
CR3				R21	351-0522	1	Resistor - Metal Film - 1/4 Watt, 5,110-Ohm
Thru 11	357-0014	9	Rectifier - Silicon	R24	351-0523	1	Resistor - Metal Film - 1/4 Watt, 8,870-Ohm
CR12	359-0036	1	Diode - Zener 5.6 Volt	R25, R31	350-1011	2	Resistor - 2 Watt, 10,000-Ohm
CR13	359-0025	1	Diode - Zener 20 Volt	R26	303-0211	1	Potentiometer - 1/2 Watt, 100,000-Ohm
CR14	359-0026	1	Diode - Zener 18 Volt	R28	350-0568	1	Resistor - 1/2 Watt 47 Meg-Ohm
F1, F2, F3	321-0204	3	Fuse 1/4 Amp	TB1	332-1252	1	Terminal Block
IC1	367-0005	1	Integrated Circuit	CR15	359-0015	1	Diode - Zener - 24 Volt
Q2	362-0017	1	Transistor - Silicon NPN		321-0163	6	Clip - Fuse
Q3	361-0004	1	Transistor - Unijunction	K1	307-1063	1	Relay, Magnetic Reed
R1	350-0355	1	Resistor - 1/2 Watt, 47-Ohm	R9	350-1014	1	Resistor - 2 Watt, 13,000-Ohm
R2, R3	350-0351	2	Resistor - 1/2 Watt, 33-Ohm	R19	350-1007	1	Resistor - 2 Watt, 6,800-Ohm
R4	350-1075	1	Resistor - 2 Watt, 4.7 Meg-Ohm				
R5	353-0040	1	Resistor - Fixed 10 Watt, 270-Ohm				
R6	353-0039	1	Resistor - Fixed 15 Watt, 5,000-Ohm				
R7	350-0398	1	Resistor - 1/2 Watt, 3,000-Ohm				
R8, R16	350-0447	2	Resistor - 1/2 Watt, 330,000-Ohm				
R10	351-0885	1	Resistor - 1/2 Watt, 51,100-Ohm				

